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INDOOR AIR QUALITY ACT OF 1987

HEARING

BEFORE THE

SUBCOMMITTEE ON ENVIRONMENTAL PROTECTION

OF THE

COMMITTEE ON
ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE

ONE HUNDREDTH CONGRESS

FIRST SESSION
ON

S. 1629

A BILL TO AUTHORIZE A NATIONAL PROGRAM TO REDUCE THE THREAT TO HUMAN HEALTH POSED BY EXPOSURE TO CONTAMINANTS IN THE AIR INDOORS

NOVEMBER 20, 1987

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INDOOR AIR QUALITY ACT OF 1987

FRIDAY, NOVEMBER 20, 1987

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
SUBCOMMITTEE ON ENVIRONMENTAL PROTECTION,
Washington, DC.

The subcommittee met, pursuant to notice, at 9:31 a.m., in room 406, Dirksen Senate Office Building, Hon. George J. Mitchell (chairman of the subcommittee) presiding.

Present: Senators Mitchell, Chafee, Stafford, Durenberger, and Lautenberg.

OPENING STATEMENT OF HON. GEORGE J. MITCHELL, U.S. SENATOR FROM THE STATE OF MAINE

Senator MITCHELL. Good morning, ladies and gentlemen. Welcome to this morning's hearing on legislation to protect the quality of air indoors.

In April of this year the subcommittee held a hearing on the health threats posed by exposure to contaminants in the air indoors. Witnesses at that hearing were in agreement on several key points.

There was general agreement that Americans spend up to 90 percent of the day indoors and that we are exposed to contaminants in the air in work places, schools, homes and other buildings.

There was agreement that indoor air contaminants such as radon, asbestos, volatile organic chemicals, combustion byproducts, and respirable particles pose a threat to public health.

The subcommittee heard testimony that radon gas is estimated to cause between 5,000 and 20,000 lung cancer deaths each year, and other contaminants result in several thousand additional cancer deaths and a wide range of other health effects.

Finally, there was general agreement that there is not an adequate effort by Federal agencies or States to conduct research on indoor air contaminants or to develop coordinated response plans addressing these contaminants.

Since that hearing, additional evidence of the health threat posed by indoor air contaminants has been published. In June, the Environmental Protection Agency issued a major report stating—and I quote:

> Indoor exposures to toxics and carcinogenic chemicals are nearly always greater, often much greater, than outdoor concentrations, and indoor air in the home and at work far outweighs outdoor air as a route of exposure to these chemicals.

In response to the growing evidence of the seriousness of indoor air contamination, I introduced S. 1629, the Indoor Air Quality Act of 1987, in August of this year. I am pleased that Senators Chafee, Durenberger, Baucus, Stafford, Mikulski, and Lautenberg joined me in sponsoring this important legislation.

S. 1629 authorizes a national program to reduce the threat to human health posed by contaminants in the air indoors. It is intended as a reasonable response to the health threats documented by the scientific community.

The legislation has several general objectives. A primary objective is to expand and strengthen research of indoor air contaminants.

As part of this research effort, the Environmental Protection Agency would develop health advisories describing the health risks posed by indoor air contaminants at various concentrations including a "no adverse effect" level. This data is essential for States and other parties to identify and respond to contamination cases.

Another key objective of the bill is to focus and direct the existing regulatory authorities of Federal agencies. The bill calls for a national response plan to be developed periodically which will identify major indoor pollutants and describe response actions.

The bill does not provide for setting enforceable standards for indoor air contaminants. In addition, it provides no new authority to regulate indoor air contaminants beyond the authorities which already exist in current statutes and regulations.

The bill will also provide grant support to those States which would like to assess indoor air pollution problems and develop programs to reduce the health threats of indoor air contaminants. We hope that this provision of the bill will foster an improved understanding of the role of State governments in responding to indoor air quality problems.

Finally, the bill gives the EPA the leadership role in responding to indoor contamination problems and sets out a process for coordination with other Federal agencies.

The bill does not preempt the development of additional legislation addressing specific pollutants such as radon or asbestos, and does not preempt State laws or initiatives.

This legislation will break new ground and I expect that there will be changes and improvements to the bill as it is developed. Today's hearing is our first opportunity to hear the views of a wide range of witnesses, including the EPA, environmental and consumer groups, and industry.

I look forward to hearing from our witnesses and will be doing all that I can to improve the bill and advance it in the Senate.

We are pleased that our first witness will be Mr. Craig Potter, Assistant Administrator for Air and Radiation of the U.S. Environmental Protection Agency.

Mr. Potter, you have been a frequent witness before this committee and, as always, we welcome you and look forward to your testimony.

STATEMENT OF J. CRAIG POTTER, ASSISTANT ADMINISTRATOR FOR AIR AND RADIATION, ENVIRONMENTAL PROTECTION AGENCY ACCOMPANIED BY EILEEN B. CLAUSSEN, DIRECTOR, OFFICE OF PROGRAM DEVELOPMENT

Mr. POTTER. Thank you very much, Mr. Chairman. I have submitted a written statement and rather than read that statement, if I might, I would ask that you introduce it into the record and I would characterize it and talk from it.

I have at the table with me Eileen Claussen, who is the Director of the Office of Program Development which is primarily responsible for coordinating indoor air activities within the Office of Air and Radiation. We also have other people with us here today from EPA, including Mike Berry, who runs the research program within ORD.

In the past several years indoor air has become a major concern within EPA, and particularly for me since my tenure began as the Assistant Administrator it has been a major priority. It is a complex subject with interaction between several offices within the agency, primarily OAR and the Office of Research and Development, but also the Office of Pesticides and Toxic Substances and the Office of Drinking Water and others within the agency.

There are three major kinds of activity that are underway when we talk about indoor air. One of those is research, and I think it is fair to say that we all have a stake in the research effort. Much of that research effort is guided by the provisions of SARA, title 4, as you know.

The other two types of activities that occur are both regulatory and non-regulatory. Much of the regulatory focus comes from specific authorizations under TSCA, for example, FIFRA, and the Safe Drinking Water Act. Non-regulatory programs tend to be much of the focus that is occurring now within OAR, with the radon programs being managed within the Office of Radiation Programs, as you know.

Much of what my staff does includes coordinating these myriad activities, formulating agency indoor air policy, assisting in setting the research agenda, and developing and disseminating information on indoor air pollution.

Our experience, particularly our experience with radon, has shown I think that non-regulatory activities are sometimes more effective in solving indoor air quality problems than regulatory activities. In the case of radon, these activities have included building effective partnerships with other Federal agencies, the States, local governments and the private sector, and disseminating information on indoor air risks and risk reduction strategies, which I think we have been doing fairly effectively.

I would like, if I might, to go through some of the outputs that we are generating and we expect to generate over the next several months and couple of years, probably. In the next several months, in the immediate future, we will be generating a booklet for the general public on indoor air quality that will be developed with the cooperation of other Federal agencies, including the Department of Energy and the Consumer Product Safety Commission.

We will also be generating a directory of State indoor air quality activities and contacts for use by a variety of audiences. We will be generating a manual on environmental tobacco smoke that will provide guidance in evaluating the effectiveness of smoking policies. We will be generating a manual on the diagnosis, prevention and mitigation of building-related indoor air quality problems, with a basic view toward providing guidance for correcting problems in commercial buildings.

Finally, we will be developing a report to Congress, as a result of the requirements of Title 4 of SARA, that will generate a series of recommendations about what our research agenda should be in the future. In essence, it will be a comprehensive report that should set the stage for a long-range research program in a way that can assure further cooperation.

In general, I think it is fair to say that our research effort will primarily focus on three things. Based on what we see right now, it will focus probably on actual exposures, the health effects at those levels of exposure, and effective mitigation and prevention techniques.

There are a lot of things that we have been doing, Mr. Chairman, in this area, and we are going to continue to do those. We have just recently completed within my office a coordinated summary of all the activities that are occurring in the agency. It may be helpful for you to take a look at that, and if you would like to, we would be happy to make it available.

I realize that my statement is critical of certain aspects of your bill, particularly those sections dealing with health advisories, the development of lists for dealing with indoor air pollutants, and the building-by-building assessment provisions. I don't want to have our lack of enthusiasm be misinterpreted.

We recognize the needs with regard to indoor air. In fact, your legislation reflects some of the needs that my staff has discussed with me. I would mention, for example, the notion of technology demonstrations and the possible benefit of those kinds of things if they can be used in a discretionary way.

I would also mention the importance of clearinghouses and the notion of using the clearinghouse approach to share information, particularly information on products and pollutants. But again, we feel that if we have this sort of tool, we will need discretion in using it, and that is largely based on our prior experience.

In general, I think the concerns that we have are focused more on the timing and the thrust of your bill than anything else, in that our basic concern is that what we are dealing with here in this bill, in S. 1629, can perhaps be best characterized as too much, too soon. Indoor air is a serious problem and it is potentially quite a serious problem, and I think maybe it is better to characterize it as a set of problems.

We are aggressively addressing that set of problems. We need a better framework, we think, for policy formation. That is not to say that we are not looking very hard at policy formation, and I would stress most of all, Mr. Chairman, that we are making a lot of progress.

In particular, I think we have made great progress within CIAQ—within the Committee on Indoor Air Quality—and with coordination generally across the Federal Government. Much of that credit goes to my staff, and particularly to Eileen and her people.

Clearly we have a long way to go, but much of our success will depend in my view upon the willing cooperation of the public, of State and local governments, and other Federal agencies. We are working very hard to forge an effective partnership, and I think we are doing quite well under the circumstances.

We appreciate the opportunity to be here and I look forward to answering your questions.

Senator MITCHELL. Thank you very much, Mr. Potter. As always, I appreciate your testimony, and as you requested, your written statement will be placed in the record.

I am naturally disappointed to hear of the administration's opposition to the legislation. There seem to be two views within EPA. The research side of the agency deserves a great deal of credit for helping to develop the scientific understanding of the health threats posed by indoor air contaminants. That side of the agency produced a total exposure report which I quoted in my statement, citing the exposure to some toxic pollutants as greater indoors than outdoors, but I am concerned about the apparent unwillingness of the rest of the agency to develop a comprehensive response to the problem. I have a series of questions I want to ask you in that regard.

Your written statement gives the impression that you have responded to the research findings and are actively addressing the problem identified in the research. You refer to an overall strategy for responding to indoor air and then you say, and I quote your statement, you have an indoor air staff:

> Whose responsibilities include coordinating these myriad activities, formulating agency indoor air policy, assisting in setting the research agenda, and developing and disseminating information on indoor air pollution.

That is your statement.

I understand that the indoor air staff consists of four people with a budget of less than $200,000 a year, out of an air office with 1,500 employees and a budget of $200 million a year. My first question is, are those figures correct?

Mr. POTTER. The figures are correct. There is actually more than $200,000. I think we have a total of about $436,000, including both extramural funds and money associated with actual FTE efforts.

I guess my basic response to that would be that it is incredible what this group of people can do with the money that they have available to them. I think that——

Senator MITCHELL. Imagine how much they could do if they had reasonable amounts available, then.

Let me ask you a question: What role did the Office of Management and Budget play in the development of your testimony here today?

Mr. POTTER. Well, they obviously had an active role in the preparation of our testimony. I think their concerns about some of the things that we have reflected in the statement are valid concerns.

I think that in general what we are dealing with is a problem that we need to understand that is very complicated, and that we could probably array a series of things that we might do but that we don't have a full set of information upon which to determine how we might do those kinds of things. The sort of concerns that we have are the inflexible kinds of requirements about funding, for example, for building-by-building surveys.

Frankly, I think discretion in the use of funding would allow us to apply it in ways in which it needs to be done, and I think that the record that we have established in the last couple of years shows that we have a pretty good sense of what is needed and that we are putting the money where it needs to be what money we have available. I think that is particularly true with research.

Senator MITCHELL. Did OMB make any significant changes in the testimony that your office originally prepared?

Mr. POTTER. We pretty much were in agreement, I think, on what—I mean, we knew what their concerns were. I think there are some areas where we disagree, and I think one of those areas is in the area of what we do to provide grants to States, for example. I think that that is an area, but in terms of the other issues—the building-by-building survey, the health advisories issue, and the development of a list approach—I think we pretty much agree that those are the kinds of things that if we set about aggressively pursuing, we may find ourselves doing that to the exclusion of other things that really need to be done.

For example, on health advisories my view is that many of the big hitters that we might deal with in health advisories have already been dealt with—radon, asbestos, formaldehyde, lindane, chlordane, those kinds of things—and that the use of health advisories for what may be a list of thousands of pollutants is something to be seriously considered.

Also, the analogy has been made to the Safe Drinking Water Act and the use of health advisories there. I would have to make the point that we don't set "no effect" levels under the health advisory approach to the Safe Drinking Water Act, so there are differences.

As a practical matter, I think, when you manage these programs you find that if you have mandated activities with authorized ceilings, that we will tend to do those kinds of things to the exclusion of perhaps some of the other things that we ought to be doing.

Senator MITCHELL. I don't want to pursue the line of inquiry about OMB. It presents us all with a difficult problem. You are part of an administration. It is understandable and expected that you will be loyal to that administration. At the same time, you are well aware of this committee's deep concern that policymaking has shifted to OMB from EPA and others, and so it is a matter that does concern us.

Let me turn to health advisories for just a moment, which you raised. As you have already indicated, you have had experience with the concept of health advisories, but you oppose the section of the bill which would provide in this case for EPA to set health advisories for contaminants in indoor air.

My question is, is the agency opposed to the whole idea of providing States and the public with basic information about the health effects of contaminants?

Mr. POTTER. Oh, no. I don't think so.

Senator MITCHELL. Well, then would you explain to me why you oppose health advisories in this case?

Mr. POTTER. Well, as I indicated, I think it is a different situation than we see, for example, under the Safe Drinking Water Act. Obviously I am not totally familiar with the way health advisories are used across the agency, but in this case I think we would be providing information. We see a role in providing information to the public more generally.

Health advisories, as I understand them, as they are used, for example, under the Safe Drinking Water Act, are basically for the use of State regulators. They tend to be extremely detailed and technical, and I think if we are to share information with the public, which we see as a major role, there are other ways that we can do it, and we are in fact moving in that direction.

Senator MITCHELL. Would you be opposed to a health advisory, then, that was not detailed and technical but in language and form sufficient for members of the public to comprehend? Is that your point?

Mr. POTTER. I don't know enough about health advisories to say whether that would still be a health advisory. I think another concern that we have is this pollutant-by-pollutant approach. We may end up being more concerned about strategies that are focused on certain kinds of buildings, for example. We may need more flexibility here in looking at pollutant streams.

Certainly in terms of the risk assessment work that is going on in the agency, we are now trying to focus more on source categories in some cases than we are on pollutants. In some cases that effort is generated by a look at a certain kind of pollutant, and then you go back from the source to other pollutants that may be coming from that source.

Senator MITCHELL. Well, by whatever term, if you did health advisories it wouldn't preclude doing the other things that you have suggested. Nothing in the bill would make them exclusive of other advisory-type material. It seems to me to be somewhat circuitous logic to say that you shouldn't issue health advisories because they are detailed and complicated, they are intended for the States, and they don't make things clear to the average layman. There is nothing in the bill that says you can't make things clear to the average citizen. They are not mutually exclusive, so why is it an argument against doing A that you are not doing B?

Mr. POTTER. I don't think it is the sharing of information, per se, that is the problem. I think it is the sort of regimented, structured way in which you do it. X number of health advisories over a period of time, with *y* amount of dollars, turns into an exercise that may take a lot of staff effort, that may generate a very technical piece of paper that may or may not be useful.

Senator MITCHELL. Is there any timetable, including period of time and number of advisories, that would be acceptable to you? We have already modified this in an effort to make it acceptable to the EPA in terms of time. Or are you just saying no to anyone?

Mr. POTTER. I can't really answer that, based on what I know now about what we are up against here. I think one of the things we have to look at is the overall research strategy that we are working on, outlining in SARA title 4, and that is timed to be submitted here next year as required by Title 4. As I said, the big pollutants we have tended to be able to deal with, and I would see the health advisory approach as being more effective in dealing with those kinds of problems, you know, the ones I listed—formaldehyde, asbestos, lindane and chlordane, things like that.

Senator MITCHELL. Let me ask you this, because my colleagues are here and I want to give them an opportunity to question. I think the health advisory section is very important, and I would ask you to review it and to provide us in writing a statement either that you are opposed to the health advisory concept in connection with this bill, period, or you are not opposed and would support it with certain specified changes.

I would really like to know what your position is. Either you are against it under any circumstances or you would favor it if certain changes are made. I would like to try to accommodate you but I can't do that if I don't know whether or not all the accommodation in the world will do any good.

Mr. POTTER. I think that is an important thing to do and to talk about. I think one of the things that we are going to be very concerned about in that response is flexibility, and obviously we have a mutual desire to share information here. That is a major objective of this effort.

Senator MITCHELL. Okay. I may have several other questions that I will submit to you in writing. In accordance with the committee's rules, the questioning will occur in the order in which the members appeared, and we will limit each round to 5 minutes and then continue for as many rounds as members have questions.

Senator Lautenberg?

OPENING STATEMENT OF HON. FRANK R. LAUTENBERG, U.S. SENATOR FROM THE STATE OF NEW JERSEY

Senator LAUTENBERG. Thank you, Mr. Chairman. I would like unanimous consent to submit my opening statement for the record.

Senator MITCHELL. That will be done.

[Senator Lautenberg's statement follows:]

OPENING STATEMENT OF HON. FRANK R. LAUTENBERG, U.S. SENATOR FROM THE STATE OF NEW JERSEY

Mr. Chairman, I commend you for holding these hearings on S. 1629, a bill to establish a national program to reduce the health risks from indoor air pollutants. I am pleased to be one of its original co-sponsors.

We are finally recognizing that some of today's biggest environmental threats come from the air we breathe indoors. We are all familiar with EPA's estimate that indoor radon may cause between 5,000 to 20,000 lung cancer deaths each year.

However, radon is not the only indoor pollutant we must worry about. Volatile organic compounds, asbestos, and environmental tobacco smoke are just some of the other threats we face.

The list is long, and these other indoor pollutants may also cause several thousand cancers per year, as well as other kinds of illness.

It's clear. We need to learn more about the risks and we need to find ways to protect the public's health.

That's why the comprehensive approach taken by S. 1629 is so important.

As you know, Mr. Chairman, I've been particularly concerned with indoor radon, and you and I worked closely to enact the first Federal law concerning indoor radon as part of the new Superfund Act.

There is still a lot to be done about radon. EPA needs to do more research on the measurement and reduction of radon levels. For example:

We need more information about ways to build new homes to keep out radon, and how to do it cheaply. Then we can work on model building codes. EPA has begun the research, but it needs to do more and needs to do it quickly so new homes are not built with radon problems that could have been avoided.

We need better approaches for measuring radon when homes are being sold. In real estate transactions, you need fast measurements. Tamper-proof measurements. You can't leave a testing device for weeks. But, today, short-term tests can be misleading. EPA needs to find technical solutions to provide quicker and more reliable estimates of the radon risks in a home. Then we can consider policies that better protect the interests of home buyers, realtors, and lenders.

But, while we advance on the radon front, we need to move forward on other indoor air pollution problems as well.

And S. 1629 would do that in a systematic way:

The bill tells EPA to publish health advisories for a range of indoor air pollutants, so that people can better understand the risks they face.

The bill calls for an indoor air quality response plan to describe how risks can be reduced. This will include regulatory options, where applicable, and nonregulatory steps as well.

The bill authorizes adequate resources for the needed research. $58 million per year over 5 years, many times the amounts that EPA has been able to spend on radon and indoor air so far.

Finally, the bill gives EPA the lead role to develop the Federal response to indoor air contamination.

In summary, Mr. Chairman, S. 1629 would give EPA the resources and mandate it needs to do the job on radon as well as the other indoor pollutants we face.

Senator LAUTENBERG. Therefore, I save the committee from having to listen to those brilliant remarks.

Senator MITCHELL. We can't wait until they are printed so we can read them.

Senator LAUTENBERG. Mr. Potter, in listening to the discussion between you and the chairman, frankly I am a bit mystified. It seems the more we learn about indoor pollutants, the more it appears as a complex issue that can be approached in many ways.

You have expressed some reservations about the bill in your statement, and you suggest that health advisories called for by the bill might not be the most effective way to warn the public of the risks from many indoor air pollutants. What is a more effective way to tell people about these risks?

Mr. POTTER. Well, as I indicated in my comments, there are a number of things that we are doing right now to share information. I think that you sort of begin with the basic distinction between the sort of building-by-building problem as opposed to, say, the products and pollutants problem.

I think that we have to learn more about the kinds of exposures that we are dealing with in the indoor environment and what can be done, first of all, to deal with those exposure levels. In the building-by-building situation, for example, if you are dealing with new buildings I think you will find that you may have higher levels of exposure with new buildings just simply because of new materials being present. No matter what you do with paints, for example, you are going to have a certain amount of volatile organic chemicals in the compounds, and those will evaporate in the early months of the building's use. The same thing with carpet, where you have formaldehyde, so you have varying levels of exposure at varying times.

To look at a health advisory approach, which tends to be a pollutant-by-pollutant definition of a problem, looking at "no effect" and so forth in sort of the abstract, you may actually not contribute much to understanding what the real problems are, and so I think that in general that is the kind of concern we have. I think that we are doing a lot here in developing different kinds of information for different kinds of situations. We have many, many things to be concerned about when we talk about indoor air.

Senator **Lautenberg**. But when we nevertheless have pointed out the lack of a threshold for carcinogens, while communicating risks, why are there special problems here? Why wouldn't we go ahead and advise people, to the best of our ability, of risks, permitting them to deal with them as they see fit, instead of saying, "Well, okay, we will determine that there may be zero risks."

It was very interesting, Mr. Chairman. I don't know whether members of the committee saw the story in today's Times about the assessment of radiation that is in the United States, and all of a sudden there is an awareness that there are double the levels that they thought initially, and that in fact radon is about 60 percent of the total exposure to radiation, once again talking about the fact that radon may be responsible for more than 5,000 cases of lung cancer annually.

This is a report assembled at the request of Federal agencies and the White House, so we see an interest in learning about these materials and conveying it though this mechanism, as opposed to having a routine established that says, "Look, we have an obligation to report to the public at large on a regular basis what it is that we are aware of that puts the public at risk."

Mr. **Potter**. Well, part of the response to your question about carcinogens is in fact what you said. They are non-threshold pollutants, and so therefore there is—the "no effect" level is zero for the most part, in fact in all cases, because we just simply don't know where the threshold is. So in those cases I think there is serious concern about the use of health advisories because we could conclude, with known carcinogens, that there is a zero "no effect" level.

Now in the case of radon, as you know, we have had to work around that issue because of technology limitations, because of in fact not being able to control down to a "no effect" level, a zero effect level. In fact, the point I guess that I am making is that there are many things that can be done without actually generating a health advisory that tells you what a "no effect" level is, and I think we have been very successful in the case of radon. We have a long way to go, as you know.

Senator **Mitchell**. Senator Chafee?

OPENING STATEMENT OF HON. JOHN H. CHAFEE, U.S. SENATOR FROM THE STATE OF RHODE ISLAND

Senator **Chafee**. Thank you, Mr. Chairman.

First I have a statement that I would like to submit for the record.

Senator **Mitchell**. That will be done.

[Senator Chafee's statement follows:]

Opening Statement of Hon. John H. Chafee, U.S. Senator From the State of Rhode Island

Mr. Chairman, I want to thank you for holding this hearing on legislation which you, Senators Durenberger, Baucus, and myself introduced to address the serious health threats posed by contaminants in the air indoors.

Over the last decade we have made considerable progress in abating some of the most harmful pollutants of our outdoor environment. Emissions from cars are no longer as injurious to the air quality, and leaded gasoline, known to cause health effects in children, is being phased out. Once unsightly rivers are now returning to a state where they are fishable and swimmable.

Yet for all this progress, we have not turned our attention to the environment where Americans spend an average of 90 percent of their time: indoors. Much is known about the effects of some indoor contaminants, such as radon, asbestos and tobacco smoke. However, there are several other contaminants prevalent in the indoor environment about which very little is known. These include formaldehyde, volatile organic chemicals, combustion by-products and respirable particles. There is a great likelihood that these pollutants pose a serious threat to public health.

Mr. Chairman, I would like to read a quote from a recent multi-year study completed by EPA of total exposure to air pollutants. The report states that "indoor exposures to toxic and carcinogenic chemicals are nearly always greater—often much greater—than outdoor concentrations. We are lead to the conclusion that indoor air in the home and at work far outweighs outdoor air as a route of exposure to these chemicals."

I trust that Mr. Craig Potter, Assistant Administrator for Air and Radiation at EPA, will expand on this statement in his testimony this morning.

At a previous hearing on the health effects of indoor air pollution before this committee, it became painfully clear that there is not an adequate effort by Federal agencies or States to conduct research on indoor air contaminants. The legislation we are focusing on today will direct the various agencies responsible for indoor air quality to coordinate their response plans to address these contaminants. The bill will place the environmental protection agency squarely in the lead in developing the Federal response to indoor air contamination.

I would like to make it clear that S. 1629, the Indoor Air Quality Act of 1987, does not place the Federal Government in the living rooms of Americans. The bill does not provide authority to "regulate" indoor air contaminants, but rather takes an informational approach. The bill instructs EPA to develop "health advisories" which would indicate the health risks at various concentration levels, and inform homeowners of ways to reduce and minimize the risk from various contaminants.

The primary purpose of the bill, however, is to *Establish a coordinated research program on indoor air contamination.* In addition, the bill will instruct EPA to *Assist States in developing strategies for the management and assessment of indoor air quality.* This legislation will establish a national indoor air quality council, within the executive office of the President, to coordinate indoor air activities of federal agencies.

Mr. President, this legislation is long overdue. Americans need to know how to insure that the quality of the air inside their home is healthy. This bill takes a giant step toward addressing the health threat posed by contaminants of the air indoors. I look forward to a productive hearing.

Senator CHAFEE. I want to thank you for holding this hearing, and legislation which you and Senator Durenberger and Senator Baucus and myself and, I suppose, some others undoubtedly are cosponsoring.

Mr. Potter, I guess this is the first time you have been up here in your new role, isn't it?

Mr. POTTER. No, I have been here before.

Senator CHAFEE. You have?

Mr. POTTER. Yes.

Senator CHAFEE. Well, I always think of you as a Fish and Wildlife man.

Mr. POTTER. 404, Senator Chafee.

Senator CHAFEE. Yes, that's right, 404. You were here many a time.

One of the problems here comes with the funding levels, and you are not supportive of the $58 million that this authorizes. What level would you suggest?

Mr. POTTER. I think that would require discussion with you because I think that probably, no matter what, where we come out, we are going to be talking about a range of levels. I don't think we know enough to really define in any certain sense what funding level we need, and much of the concern that we have about this bill is the mandated level that is required for certain kinds of activities and the elimination of discretion in the use of funds.

I guess we feel warranted in making those points because I think that we have allocated the funds that we have in an appropriate way. I think we really are putting the effort, in general, where it needs to be put. Now we might argue about whether or not there is more money needed in some of those areas, and I would suggest if you would like to talk about that, that we talk about that. I can't give you a specific number.

Senator CHAFEE. I am not sure what you mean, "talk about it." Here we are.

Mr. POTTER. Well, we have not—the position that we have taken in the statement on funding is that we don't support the funding levels in the bill, and I——

Senator CHAFEE. Well, I would be delighted to talk about it.

Mr. POTTER. There are some things in the bill that we like, that we feel we ultimately will have to do. Technology demonstrations is one of those things. The concept of a clearinghouse and how it might be used is another one, but in fact we have had experience with clearinghouse efforts and we have found that unless you target those efforts fairly specifically, you can generate a lot of information that may not be very useful.

Particularly we have had that experience with air toxics, and we are going through that experience right now in my office. We have had a very successful recent effort to develop a clearinghouse effort with air toxics, but we have discovered that you really need to target those kinds of things.

Senator CHAFEE. You mean if you have a bunch of information available, people won't come and ask for it?

Mr. POTTER. That's exactly right.

Senator CHAFEE. Well, I don't dispute that. I think you have to get out there, but it seems to me that, first of all, we want to make it clear that this legislation isn't putting the Federal Government into everybody's living room. EPA, in its own report, says that we, as citizens, are at greater risk from indoor than outdoor air pollution; not that funding is everything, but I am not sure how we can solve these problems with only $3 million.

Again, I am not saying that if you put in more money, therefore the problem is solved, but it is a big challenge. I would be glad to spend some more time on this. Now you are going to send this letter to the chairman, and that would be of interest, and that would be of interest, and then I hope we do have a chance to discuss the funding level.

Mr. POTTER. I apologize for not having gotten that letter up here sooner. We did bring it this morning.

Senator CHAFEE. Well, I didn't mean that. I didn't mean the funding level, but you were going to submit to the chairman what you could support in legislation——

Mr. POTTER. Oh, yes.

Senator **Chafee** [continuing]. And what you couldn't, because obviously in anything we do around here, we would like to have the administration aboard. It makes things go much easier.

Mr. **Potter**. Sure. I understand.

Senator **Chafee**. Again, let me say my first comment was that you hadn't been up here before. I mean as a principal witness. I have seen you. Obviously you have been up here with Mr. Thomas and so forth, but I think this is the first time we have had you right in our sights.

Mr. **Potter**. Right. Well, it is an honor to be back here, Senator Chafee.

Senator **Chafee**. Fine.

Thank you, Mr. Chairman.

Senator **Mitchell**. Thank you, Senator Chafee.

Senator Stafford?

Senator **Stafford**. Thank you, Mr. Chairman. I have no statement.

I am sorry I missed the first part of your presentation, Mr. Potter. Just one or two questions. I notice one of the possible pollutants, in the information in front of me, is carbon dioxide inside a house, but my impression has always been, as non-chemist, that carbon dioxide is virtually an inert gas, is it not? Unless it is present in very large quantity, I wouldn't think it would be harmful in a house.

Mr. **Potter**. I think you are basically talking about non-cancer health effects. I think there is carbon dioxide emitted from certain kinds of combustion appliances, from heating and ventilating systems, and I think there is even a component in environmental tobacco smoke, respiration, of course. That is the pollutant that was responsible for the loss of thousands of lives in Central Africa.

Senator **Stafford**. I understand that one of the six most dangerous pollutants within a house would be radon——

Mr. **Potter**. Yes.

Senator **Stafford** [continuing]. And the chairman of this subcommittee and the ranking member have been working in that regard. I notice asbestos is another, and I would note that Senator Baucus and this Senator have joined in two bills, one of which would require Federal buildings to eliminate asbestos in any dangerous condition, and one which I have introduced would go beyond that to any public building in the country containing more than 10 tenants, would be required under that bill to take steps to eliminate any dangerous, friable asbestos.

I note finally that information available to this committee indicated that there are still some 30 million tons of asbestos around the country, and several million private houses probably have asbestos in them. Nobody knows what the story is there, and I don't know that it would be possible to do something about it even if we knew what the story was and were inclined to do it, but that certainly is a problem.

Mr. **Potter**. It certainly is, and asbestos is one of those issues that we wrestle with continuously. Much of it is done now in the context of enforcement, because we do have specific requirements. We are continually coming across new examples of the problem that have to be dealt with, and there is a lot of fur attached to that one. You know, when people find out they have asbestos, they react in different ways, but it is a serious problem.

Senator **Stafford**. I gather, finally, that as houses have become more airtight to save energy, that it has raised the dangers of the interior atmospheric contaminants that may be present. When I read about that, I take some comfort from the fact that our house down here, in spite of my wife's protests, has never been made very airtight. In fact, there are times when you could use it for an air test tunnel if you wanted to.

But that being the case, still we may be healthier there than we would be if it were airtight.

I thank the chairman.

Senator **Mitchell**. Thank you, Senator Stafford.

Mr. Potter, I just want to say that for 7 years, the 7 years I have been here, this committee, most of the time under the able leadership of Senator Stafford and Senator Chafee, has struggled mightily to lead in the area of protection of the health and environment of Americans. In too many cases, unfortunately, the first and biggest obstacle has been the administration.

As Senator Chafee said, it is always so much easier and better to work together. We had, earlier this year in the legislation on radon, a really cooperative effort. We worked well with the EPA. It was not a case of just obstruction. They made constructive suggestions. There were compromises on both sides, and we got meaningful legislation passed.

I have drafted this legislation with that experience in mind. We sought the agency's advice. We made changes to accommodate, and we are prepared to make further changes.

I am trying to think of the right word. We beseech you to work with us in this area. The evidence is clear. Most of it comes from your agency, and I must say that the conclusion is inescapable that you folks at EPA know there is a problem, want to do something about it, but OMB is calling the shots. That is the inescapable conclusion that we have—that I have. I will speak just for myself.

We want to work together. This is an important area, but what I want you to tell us clearly and unequivocally is whether you are prepared to work with us to deal with the problem, or whether it is just going to be "No," and therefore we have got to prepare and fight and recognize that the first obstacle, as so often in the past unfortunately, is the administration; that we have to get over that hurdle before we proceed any further.

I can't speak for the other members of the committee but I sense that they share the feeling I have. It is a wearying struggle to have this opposition from the administration always right there out of the starting blocks. We had such a good experience with radon, and even in some other areas, that we hope very much we can have that kind of cooperative attitude if you can see your way clear to do it.

I am not asking you to do anything you don't feel is in conscience, correct, or in the best interests of the country, but it is really an inescapable conclusion when we look at all the evidence and talk to you folks, that you really understand there is a problem and want to do something about it but you are bound by OMB. So I look forward to hearing from you in writing with some specifics, and hope that we are going to be able to do something. This is an important area.

Mr. POTTER. Well, I thank you for the words about radon. I think many of the people who were involved in that effort within the agency are here today. At least one staff member is up on the dias working with Senator Lautenberg these days.

I think one of the problems that we are dealing with here is a broader problem in terms of budget deficits. One of the concerns that we have and that I have personally, frankly, is that sometimes we set these authorizing ceilings and if the programs go forward, we then have to—we don't necessarily get the funding, the appropriation to do it, and it has to come from someplace else in the program. That is a real problem.

We have the same objectives for the most part, and I think that we have a dedicated crew, and particularly we do in OAR, and I think they are doing a good job of trying to solve the problems, the same problems that you are concerned about. We have a lot of things on our plate, as you know, and that is a major consideration, but I can promise you we will get back to you with an honest response.

Senator MITCHELL. Fine, but just remember, there is nothing that you have to do that is more important than protecting the health of the American people.

Mr. POTTER. I understand that.

Senator MITCHELL. Nothing.

Mr. POTTER. I understand that.

Senator MITCHELL. For too many years, environmental legislation has been placed in the context of protection of natural resources and has come to create among the American people an attitude that it is not something that concerns many of them in their daily lives. We are now coming to understand, late but hopefully not too late, that all that we are talking about in essence is protection of the health of Americans, and there is nothing that you or that we have that is more important than that.

Mr. POTTER. I agree with that. I do think we have to be real concerned about the priorities as we go forward in doing that, and we try to set a framework constantly for that, as you know.

Senator MITCHELL. Senator Lautenberg?

Senator LAUTENBERG. Thank you, Mr. Chairman.

In the context of the chairman's concerns as expressed and your responsibility, Mr. Potter, if this becomes law, obviously you are going to respond to it and do what is required. If you had to list a bunch of pollutants, a half a dozen, a dozen in these 12 health advisories, how would you go about selecting which ones you would list?

Mr. POTTER. Well, I can't answer that, I guess, directly. I would answer in general in the way I answered it before, which is that I think we would begin with the ones that we are already dealing with—radon, chlordane, asbestos, formaldehyde—the big hitters, so to speak, the ones that we really have to be concerned about in terms of risk.

Beyond those—I mean most recently we have had pollutants like lindane and chlordane that we have come to grips with—beyond those I think you get to a more detailed review of a lot of pollutants, and I can't answer that question in detail. I don't know whether Eileen would care to, or perhaps we could respond in writing, but——

Senator LAUTENBERG. Well, the fact is that you would have the responsibility, again assuming that along the way we get some cooperation and we get this into law. You would have to be thinking about that, and I would appreciate it if you would.

Mr. POTTER. My concern, Senator, would be more along the lines of what I said earlier, and that is that once you got advisories or whatever information out on the so-called big hitters, you might be up against this effort which would cover perhaps certainly hundreds and perhaps thousands of pollutants. If we were locked into some kind of an effort over time, we might be generating something that may not be helpful in a risk environment.

Senator LAUTENBERG. Well, except if we took the most dangerous ones, known carcinogens, et cetera, then we would have a fairly bite-sized, if you will, base to work with.

The other thing that I would like to ask, would you agree that with the funding that is provided, with the focus that is provided here, that we would maybe get a jump on doing more radon research from these funds. Would that help? As we learn more about the problem of radon, its national character, the degree of health jeopardy, do you think we are doing enough now to understand radon, to be able to work with the problem, to be able to make the citizens of the country, people who are exposed, aware of the risk? Do you think there is room for more research to be done there?

Mr. POTTER. That's a hard question to answer. I have been in some places where there is real resistance in States, based on previous experience, to any further Federal push here. In those cases I think it is better sometimes to sit down privately with people and to share with them some of the concern, some of the risk information we have, and try to generate a more cooperative effort, and I think we have seen that in some areas, whereas if you go in and you force-feed them, you may get resistance.

There are places in this country where they have had experience with radon in the past and they don't think it is a serious problem, and yet based on what we see with new construction and some of the characteristics of new houses, they should be concerned. In some cases you have States with remote locations, remote residences and fairly sparse populations, and they are quite concerned about a major effort that may be overkill.

I think there are ways that you can deal with these things, but I think it is fair to say we always feel like we probably need more research with any of these things.

Senator LAUTENBERG. But no matter what you choose here stylistically as an approach, the fact is that you have a responsibility. The chairman's admonition I thought very clear, and I saw you shaking your head in agreement, that your obligation as much as you can is to protect the national health.

Mr. POTTER. I agree.

Senator LAUTENBERG. That being the case, then you have got to sound the alarm wherever you can, and you can't be delicate about relationships with people who want to keep it quiet. Maybe that is someone who owns a piece of real estate that is radon-flooded and would like not to talk about it, but your concerns can't be those. Your concerns have to be about the health of the people who we are obliged to protect, and you in particular, so I would hope that you will put aside some of the constraints being proposed by others and devote yourself, as we know—Senator Chafee remembered you in your other role and so do I—someone who is committed professionally to do the best job you can and not to protect the budget. We will take care of that tonight at midnight.

Mr. **POTTER**. I am committed to that, Senator Lautenberg.

Senator **LAUTENBERG**. Thank you.

Senator **MITCHELL**. Thank you.

Senator Stafford?

Senator **STAFFORD**. Mr. Chairman, I simply wanted to note that I agreed with a statement that you made a few minutes ago to Mr. Potter. I think it was well said and I want to be associated with it.

As a footnote I would urge, Mr. Potter, that you and Lee Thomas not be unduly deterred by OMB. I remember a public discussion with the head of that agency last spring about education, in which it was the burden of his suggestion that if you start with $19 billion for Federal aid to education and subtract $4.5 million, you still had more money than you did to start with. That even baffled the Senator from Vermont, so their new math shouldn't deter you too much.

Senator **MITCHELL**. Thank you, Senator Stafford.

I am pleased that Senator Durenberger has been able to join us. Do you wish to make an opening statement? Mr. Potter has completed his remarks. You have no questions for him?

Thank you very much, Mr. Potter. We look forward to hearing from you and working with you.

Mr. **POTTER**. Thank you, sir. We look forward to the same thing.

Senator **MITCHELL**. The next witnesses will be in a panel: Dr. Alfred Munzer, representing the American Lung Association; Mr. Stephen Brobeck, the executive director of the Consumer Federation of America; and Mr. Philip Merrill, the executive director of the Maine State Employees Association, representing the Service Employees International Union.

Good morning, gentlemen, and welcome. For your benefit and for those of the witnesses on the next panel, let me briefly restate the committee's rules. We ask each witness to limit their oral remarks to 5 minutes. The lights on this box before me indicate that when the green light is on you can keep talking; when the orange lights up, you had better start thinking about wrapping up; and the red light means stop.

The full text of your statements will be placed in the record. We do appreciate very much your taking the time and trouble to come here and providing us with your advice and counsel, and we look forward to hearing from you. We will begin with Dr. Munzer.

STATEMENT OF DR. ALFRED MUNZER, REPRESENTING THE AMERICAN LUNG ASSOCIATION

Dr. **MUNZER**. Thank you, Mr. Chairman.

I am Dr. Alfred Munzer. I am director of critical care at the Washington Adventist Hospital, and I am delighted to appear here today on behalf of the American Lung Association. We are the Nation's oldest voluntary health agency, and are dedicated to the prevention and control of lung disease. Together with our medical section, the American Thoracic Society, we have long recognized the contribution of air pollution, both indoors and outdoors, to the development of lung disease, and air quality has been a part of our program since 1966.

It is a common fallacy that air pollution is primarily an outdoor problem and that the indoor environment provides protection from outdoor pollution. Although causes and effects may have been less well defined, it may be that the indoor environment is perhaps more polluted than the outdoor environment. The magnitude and severity of this public health problem has been worsened by new energy-conserving practices and the increased use of certain building materials and consumer products.

We believe that there is sufficient knowledge about the health risks of indoor air pollution to warrant increased Federal intervention. To date, EPA has addressed the problem of indoor air pollution through the provision of information, leaving the resolution of the problem to the individual.

The Indoor Air Quality Act of 1987, introduced by you, Mr. Chairman, with the support of many members of the committee, is a positive step towards a more appropriate regulatory approach for the Federal Government. It is clear that as the program progresses, additional efforts will be needed.

We do offer a few specific comments regarding provisions of S. 1629. On section 5, Indoor Air Quality Research, the specific objective of research conducted under this section should be the compilation of information necessary to enable the agency to proceed with tasks required by other sections, including in particular the contaminant health advisories.

We suggest a specific reference requiring EPA to collaborate with the National Institute for Environmental Health Sciences. This institute is responsible for a variety of programs that are geared to evaluating the human health effects of most of the identified major toxics in the indoor environment.

In section 6, the Indoor Air Contaminant Advisories, we support this section wholeheartedly. We endorse the compilation of a list of contaminants and stress the importance of public participation in the development of the list. It is critical that the advisories be prepared with the public in mind, to facilitate understanding of the information and its use.

It is important that the advisories be explicit where there is no known safe threshold for a particular pollutant, especially for known or suspected human carcinogens. We also recommend that the advisories include recommended mitigation measures where they are available.

In section 7, the National Indoor Air Quality Response Plan, we recommend that the EPA consider immediate as well as long-term actions. For example, the phase-down or phase-out of a particular contaminant can have immediate results in human exposures. Long-term actions may have to address technology development mechanisms.

Section 8, the State and Local Air Quality Programs: Recognizing innovative activity by State governments, the bill provides for grants for the management and assessment and response to the advisories, and we support the inclusion of this section and commend the author for providing for public comment on the management and assessment strategies. Such comments should also be allowed on the response program.

In summary, Mr. Chairman, the bill creates a program that is scientifically sound and a reasonable approach to a range of health effects known to be caused by indoor air pollution. The American public deserves a safe and healthful environment indoors and out.

Thank you.

Senator MITCHELL. Thank you, Dr. Munzer.

Mr. Brobeck?

STATEMENT OF STEPHEN BROBECK, EXECUTIVE DIRECTOR, CONSUMER FEDERATION OF AMERICA

Mr. BROBECK. Thank you, Mr. Chairman.

The Consumer Federation has a well-deserved reputation for being sparing in its praise of Members of Congress, but this morning I will place in jeopardy this reputation by acknowledging that the Nation owes you and other subcommittee members present a great debt of gratitude for your leadership on indoor air quality.

Your earlier hearings documented the fact that indoor air pollution represents a very serious health hazard—in our view the Nation's number one hidden health threat. Each year this pollution kills thousands of Americans and injures millions more. That is why EPA, in its assessment of 31 environmental hazards, ranked radon first and indoor air pollution from other sources fourth as a threat to public health.

However, since these hearings there has been mounting evidence that the public is becoming as concerned about these dangers as is your committee, EPA, and the witnesses at this hearing. State health departments report a rising number of inquiries about radon. EPA just indicated that it has already distributed, by request, 400,000 copies of its "Citizen's Guide to Radon" brochure. There is a growing public pressure, well-publicized in the press, for smoke-free public places in offices, restaurants and airplanes. There is increasing employee and trade union concern about work place hazards such as asbestos; and there is every expectation that this public concern will continue to grow.

In this context, your Indoor Air Quality Act represents an effective, appropriate response to this concern as well as to the hazards themselves. It recognizes the need for leadership and action by EPA. It provides this agency with needed direction and adequate resources. It expands and focuses current research. It significantly advances the dissemination of vital health information to the general public, as well as to those with professional interests and responsibilities; and it crafts a strategy to improve coordination among Federal agencies.

Now if this bill were enacted and fully funded, it would cost the Treasury nearly $60 million a year. Can such an expenditure be justified in an era of unprecedented Federal budget deficits? We believe it is easy to do so, even in purely economic terms.

Several years ago the Consumer Product Safety Commission estimated that indoor air pollution costs our Nation as much as $100 billion a year in medical costs and lost days at work. Using the conventional economic estimate of a human life as worth $1 million, just the 5,000 to 20,000 cancer deaths from radon each year and the 3,500 to 6,500 deaths from non-radon indoor air pollutants would impose costs of roughly $8.5 to $26.5 billion on our society. If your legislation were to reduce these deaths by only 10 percent or even by 5 percent, it would pay for itself many times over. Yet these huge expenses pale beside the far greater human costs—the pain and sorrow of the thousands who lose their lives, the millions who are incapacitated by illness, and their many loved ones.

Mr. Chairman, your legislation represents a sensible, measured response to a serious health threat that our society is finally beginning to recognize as such. We commend you and the other cosponsors for your concern and for your initiative.

Senator **MITCHELL**. Thank you very much, Mr. Brobeck.

I am pleased to welcome Mr. Phil Merrill here. Mr. Merrill is a personal friend of mine of many years' standing. He has been very active in this area in Maine, where we have had a specific problem of so-called sick buildings, and he will address that issue, something I think we must deal with increasingly throughout the country.

Mr. Merrill, welcome.

Senator **CHAFEE**. Mr. Chairman, I just want to say one of the joys of having you as chairman is, we see a good number of Maine witnesses before the various subcommittees which you are chairman of. Has the entire State of Maine been run through yet, or have we missed somebody?

Senator **MITCHELL**. I think there are a few people up in Serrano we haven't gotten to yet.

Senator **CHAFEE**. Glad to see you, Mr. Merrill.

Senator **MITCHELL**. Phil, before you begin, I am advised that this is a vote on the Carlucci nomination. That will be a 30-minute vote. May I suggest that those who choose to do so, perhaps someone go vote now and plan to be back, so that we can keep the meeting going without pause?

Senator **CHAFEE**. What I would like to do is listen to Mr. Merrill, since we have 30 minutes and he will be 5 minutes.

Senator **MITCHELL**. Are you going to come back, Dave? Can you come back? Well, then Senator Durenberger will be the first to go and come back, and we will proceed then.

Thank you, Mr. Merrill.

STATEMENT OF PHILIP MERRILL, EXECUTIVE DIRECTOR, MAINE STATE EMPLOYEES ASSOCIATION, REPRESENTING THE SERVICE EMPLOYEES INTERNATIONAL UNION

Mr. **MERRILL**. Mr. Chairman and members of the committee, I am proud to be here and to have a chance to testify before this group. I hope that Senator Chafee's suggestion that you have dredged up the last of the dregs of the State of Maine wasn't prompted by my appearance in some way although he may feel well justified at the end of my testimony in believing so.

I am testifying today not only on behalf of the people that I represent in the State of Maine but on behalf of people who have joined in our coalition, which includes the New Hampshire State Employees Association and the Service Employees International Union, which represents public and private employees across the country.

I want to say that we came together in what is a rather unique coalition because we shared a common experience, which was that our members were experiencing ill effects, in some cases serious health effects, from working in certain buildings under certain air conditions, and we were unable through the traditional means that unions might use to address such problems, to satisfy ourselves that we were doing anything significant to provide some relief from those problems. After we got together and started sharing some of our common experiences, we came to the conclusion that there were several elements lacking in what has to be present to have a successful program to deal with these kinds of problems.

First in terms of the health professionals that we were able to reach out to at the actual level of operation, there is a great, I think, absence of knowledge on these subjects.

Secondly, with the people who have the responsibility of making these decisions, in State government and I think in the private sector, there is almost what could be described as a vacuum of information available, in many cases a total lack of knowledge that there are any problems to be concerned about.

Third, there are no standards that exist at the present time in any sort of government-defined way as to what kind of conditions are acceptable, even what kind of conditions in regard to the percentage of oxygen that should be in the air or how much fresh air has to be brought into the buildings. There are no standards that we can point to.

Fourth, I think there is a desire on the part of many to ignore this problem, even people, public decisionmakers who start to see its size and its dimension. I think there is a feeling that if somehow it is called attention to, if it is admitted, if it is recognized, that it is going to trigger some sort of series of events that will be costly and possibly there will be an overreaction. With all due respect, that feeling may have been represented in some of the testimony that finally made it through here from the executive branch today.

Mr. Chairman, we find that the bill that you have presented addresses all four of those problems in a very significant way, and that it would provide meaningful help to people like myself who are trying to find responsible ways to deal with these problems when they manifest themselves in the experience of people that are working in these buildings. We think that it is a measured response. It is a response that shows and recognizes that the Federal role has to be one that is limited, measured in the area of regulation of real property and structures, a role in which the States and local governments have traditionally had a major role, but it is a role that recognizes that only the Federal Government can provide leadership. I hope that the bill passes in a way that brings that leadership from the Federal level.

There are just a couple of specific suggestions that I think maybe are worthy of drawing to the Senators' attention in my oral testimony here today.

First, in the section on findings in the bill and in the sections on research in the bill, I would urge you to specifically include efforts to determine what the costs of this problem are in terms of productivity. I agree completely with Senator Mitchell in your remarks that the first concern has to be public health, but very frankly we find that we are often more able to motivate decisionmakers if we can show them that they will actually save money in their efforts, than we are if we simply have to rely on arguments that pertain to how healthy people are. We think our initial efforts in this area demonstrate what the previous speaker has testified to, and that is there is actually money being lost as a result of not dealing with this problem.

Secondly, we would hope that in your findings section again you would point out that one of the things that is making people sick in many cases in indoor buildings, are bacteria and fungi that actually grow in the air systems themselves, the mechanical systems that we rely on in modern buildings to bring our air in. I think it is useful, maybe, for the purposes of thinking about that, to imagine that you are underwater and you are relying on a tube through which to breathe. You would be concerned about the cleanliness of that tube and what was in it. Well, the mechanical systems that bring in our air have the same relationship to us, and they ofttimes themselves pose a great threat. We have examples of that in the State of Maine, where people have actually become very sick as a result of this.

So I would hope that you would make those additions or other suggestions we have made, but my greatest hope is that you and the other sponsors of this bill are successful in passing something like it. We think it would be a great contribution to efforts of people like ours to address this problem.

Senator MITCHELL. Thank you very much, Mr. Merrill.

Mr. Brobeck, I was very interested in the figures you cited in your oral remarks. They are not in your written statement, are they?

Mr. BROBECK. No. They were in the testimony I gave last April, however.

Senator MITCHELL. At the previous hearing? All right. My question was going to be, are those the same figures that you gave that time?

Mr. BROBECK. We have used the $100 billion figure that was suggested by the CPSC several years ago. But just this week we have also made a calculation based on recent EPA data on cancer-related deaths from non-radon indoor air pollution sources, and on the conventional estimate of equating a human life with $1 million.

Senator MITCHELL. All right.

Mr. BROBECK. The mathematics are very simple, and the figures then are very substantial.

Senator MITCHELL. I think both you and Mr. Merrill have made a good point in terms of substance and political tactics, that it is very important for us to document that to the extent possible, so I would ask you if you could review all of the data in this field and provide us with a written update that would supplement, if there is any supplementary information, the remarks you have given in that regard. It would be very helpful to us.

Mr. **Brobeck**. We would be pleased to do so. (See p. 57.)

Senator **Mitchell**. Dr. Munzer, have you had experience with patients affected by indoor air pollution?

Dr. **Munzer**. Certainly, particularly patients who already have lung disease, such as patients with emphysema, chronic bronchitis, or asthma. These people are particularly susceptible to indoor air pollutants, especially bacteria and fungi, which have been mentioned already.

Another group that comes to mind are the patients that I have occasionally who give no history at all of smoking and yet develop lung cancer. Now, of course, we begin to wonder whether radon in fact may have been responsible for their disease.

Those are really just two groups. Children constitute another group that is very much at risk for indoor air pollutants, largely because they are really captive to the pollutants, including their parents' tobacco smoke.

Senator **Mitchell**. In your prepared statement you recommended a more rapid timetable than that suggested in the bill for developing health advisories. You are a physician and you represent the American Lung Association, and so your emphasis is understandably on the health aspects and the health advisories.

You were here when Mr. Potter testified in behalf of the EPA in opposition to health advisories. My first question, has he persuaded you that you were wrong in your approach?

Dr. **Munzer**. No, absolutely not. We continue to support the concept of health advisories. We think it is an outstanding way of informing the American public about hazards in an organized fashion, and we do hope that this can be implemented as rapidly as possible.

Senator **Mitchell**. So to the contrary, after hearing Mr. Potter, may I take it that you are——

Dr. **Munzer**. We feel even stronger.

Senator **Mitchell**. Feel stronger, yes. All right. Thank you.

Mr. Merrill, could you give us some information about the problem of specific buildings? I know you have had an experience with that in Maine, and we are trying to find out if that is a unique, isolated case, whether this is a problem that may or does exist in other areas, and what are its dimensions and what can we do about it?

Mr. **Merrill**. I think that there are some generalizations that are generally true, that we are pretty certain of, and that is that specifically buildings that are built to be tight, particularly buildings that have been built since the concerns about energy have really changed the way we look at buildings, pose a much greater chance that all of the problems that are kind of reflected in this bill are going to be exaggerated and made worse. Because they do become totally dependent on mechanical air systems, because those systems are often under-designed, badly maintained, all these concentrated problems become more concentrated, obviously, if there is not an exchange of fresh air.

We have surveyed our members in both the State of Maine and the State of New Hampshire, and we have found a factor that in many cases is 50 percent, looking at health effects, simply by asking the basic question: "Is there some way that you yourself can take action to bring air into the building? Can you open a window? Can you adjust the amount of fresh air that is available to you?" Now that is a pretty rough standard of measure but I think it suggests where a lot of the problems are at least exaggerated, in these buildings where there is no way to get air in except what somebody designed and somebody maintains and somebody operates.

Senator MITCHELL. Do you have any information on which to make a judgment as to how prevalent this may or may not be? That is, is the experience you have had in Maine with a particular building, is that a unique case, or are you simply unable to respond because you don't have information?

Mr. MERRILL. I think the cases that have immediate, very strong, noticeable negative effects on people certainly don't represent anywhere near like a majority of the cases in new buildings, though ofttimes we experience problems that a lot of people notice, in probably most cases in new buildings, particularly when they are first opened and lot of the problems with formaldehyde and other sorts of things haven't been dissipated. But I would say that in a significant number the problems are bad enough so that in a very short time we have very serious health problems develop.

I don't know if that answer is helpful to you, Senator. I don't want to—one of the things I am concerned about in this area, and I think that deters public decisionmakers, is that somehow any information is going to result in people being overly alarmed, I mean, if there is no way that we can count on our citizens to make a measured response, recognizing that there is a serious problem. One of the hopes that we would have is that, specifically among demonstration projects, we could have some demonstration projects that would be aimed at striking down that notion, that would look to the ability to educate people and have a measured response themselves, because I think that deters people if you state that as a possible effect, that people are going to overreact.

But in the extreme this is a very serious problem. We have had buildings in which we have found fungus in the buildings and we have found fungus in lungs that have been removed. I think when you get to that level of health effect, you are dealing with something that can't be ignored even if some would desire to do so.

Senator MITCHELL. Well, thank you very much, gentlemen, all of you. Your testimony has been very helpful.

We will now continue with the final panel. The witnesses include Dr. James Woods, senior environmental manager, indoor air quality, at Honeywell Corp.; Mr. John Bond, executive director, National Council for Clean Indoor Air; and Dr. Michael Hodgson, Environmental Health Committee of the American Society of Heating, Refrigerating and Air Conditioning Engineers.

Good morning, gentlemen. Welcome. We look forward to your testimony. We will proceed under the rules that I described to the previous panel of witnesses, and we will begin with Dr. Woods. Good morning, Dr. Woods.

STATEMENT OF DR. JAMES WOODS, SENIOR ENGINEERING MANAGER, INDOOR AIR QUALITY, HONEYWELL CORP.

Dr. WOODS. Good morning, Senator. Thank you for inviting us to participate this morning.

I have prepared a written statement and wish to present an oral summary, if that is acceptable. In the credentials that I submitted to you, I omitted one statement that I would like to add. I have recently been appointed to the IAQ Panel for the EPA Science Advisory Board.

Senator MITCHELL. All right. Dr. Woods, would you bring the microphone close to you and speak directly into it, if you can, please?

Dr. WOODS. Thank you. The objectives of the testimony today are threefold: one, to share some recent experiences on diagnosis of "sick" buildings; two, to comment on the Senate bill; and, three, to present some additional recommendations as time permits. I think I may run out of time on the buzzer here.

In the one and a half years since Honeywell began its indoor air quality diagnostics business, we have received about 300 inquiries and have investigated about 30 of the most complex cases. We have recently analyzed our findings from some of these buildings.

We find that all those that we investigated involved sick building syndrome. In addition, symptoms of building related illness were involved at about one-third of the cases. The most frequently identified problems were chemical and microbiological contaminants and temperature and humidity.

Physical causes of the complaints can be characterized as operational and design factors. All cases involved design inadequacies such as inadequate air supplies, filtration, and access panels to equipment. Operational factors included lack of sufficient maintenance, changes in thermal and contaminant loads since initial occupancy, and the implementation of energy management strategies without evaluation for environmental impact.

To obtain office workers' perspectives of the problem, Honeywell commissioned a national survey to assess the role that air quality plays in contributing to a productive office environment. About one-fourth of the respondents were dissatisfied with the air quality in their work place, and about one-fifth perceived that their performance was hampered by the air quality. As a result of this information, we have hypothesized that 20 percent of the office workers in the United States are exposed to environmental conditions that are manifested as sick building syndrome.

Our data indicate that improvements in the design and operation of indoor environmental systems not only reduce the percentage of occupants who perceive that the air quality hampers their performance, but can also reduce the cost of operating the system. Thus, if occupant performance can be increased by methods that reduce costs of operation, a significant increase in productivity should result.

For example, what would be the impact on our gross national product if, by means of improvements in system performance, the percentage of those who perceive that air quality hampers their performance is reduced from 20 to 10 percent?

In previous testimony on indoor air quality research before the House of Representatives Committee in 1983, I recommended seven needs regarding energy conservation and acceptable indoor air quality that should be addressed by both governmental and private organizations. It is gratifying to find that this bill addresses most of these needs in a comprehensive and focused manner.

The focus of the demonstration projects at both the Federal and State levels is especially important, and will provide a practical base for the required research and the education and training aspects of the program. There are, however, three major issues that have been neglected in the bill: perceived responses of the occupants, energy management, and economic factors.

In addition, there are four recommendations in a recent report published by the Building Research Board that should be addressed in this bill. I have a copy of that report with me and I would be happy to give that to you at the end of this hearing.

Senator MITCHELL. Thank you very much. We look forward to receiving that.

Mr. WOODS. The perceived responses of the occupants, including odor, annoyance, and thermal discomfort, should be addressed in this bill. Perceived responses is one of three categories of complaints about poor air quality that were identified in that recent Building Research Board report. Contaminants in this category are mostly associated with sick building syndrome. These complaints can often be mitigated by improving system performance, although the specific cause of the complaints may not be identified.

The bill seems to focus on the second category of complaints identified by the BRB, non-perceptible physiological stressors such as airborne biological contaminants, radon, asbestos, and carbon monoxide. These are most closely associated with building-related illness. Because of the thousands of contaminants in this category, it may not only be impractical but impossible for the administrator of the program to publish advisory material addressing human health effects of individual contaminants, as directed in the bill.

There is a third category identified as perceived non-physiological stressors, but I will skip that. It is in the written testimony.

The second of the three issues neglected in the bill is energy management of the facilities. This has often been cited as a cause for poor indoor air quality and should be addressed. The third issue neglected is the economic impact, either positive or negative, that might result from modifications in system performance. Costs associated with lost time due to illness or discomfort are seldom factored into the management strategies for facilities. The effect of indoor air quality on productivity should be addressed in the bill.

Senator MITCHELL. Dr. Woods, I am going to have to ask you to suspend briefly. I have only a few minutes to get over to cast this vote, so we will stay in recess. I would ask the witnesses to remain, though, because some of the other Senators I believe are on their way back and hopefully will be here momentarily and will continue the hearing. If not, I will return as soon as I can vote. At the most this will be a 10-minute break or so, so thank you very much, and we will suspend just briefly.

[Recess taken.]

Senator **Chafee** [presiding]. Our witnesses may return to the table, if they would, please—Dr. Woods, Mr. Bond, and Mr. Coda.

As I understand, Dr. Woods, you are in mid-flight?

Dr. **Woods**. Yes, sir.

Senator **Chafee**. All right.

Dr. **Woods**. I had completed everything except the conclusion.

Senator **Chafee**. All right. Go to it.

Dr. **Woods**. There were some additional comments that I will omit from this summary.

Senator **Chafee**. Fine. Why don't you continue?

Dr. **Woods**. In conclusion, the comments presented here are meant to be constructive and supportive of the bill. In general, I wish to congratulate the sponsors of this bill and endorse it as an excellent beginning in dealing with a potential major problem in a comprehensive and focused manner. If it is implemented, I am encouraged that not only will indoor air quality problems eventually be minimized, but occupant health, comfort and performance will be enhanced, energy efficiently and cost effectively.

Senator **Chafee**. All right. Thank you. Thank you, Dr. Woods.

Mr. Bond, National Council for Clean Indoor Air.

STATEMENT OF JOHN BOND, EXECUTIVE DIRECTOR, NATIONAL COUNCIL FOR CLEAN INDOOR AIR

Mr. **Bond**. Thank you, Senator.

Senator **Chafee**. Speak right into that mike, please, Mr. Bond. Pull it right up to you, if you would, please.

Mr. **Bond**. Does that do it?

On behalf of the National Council for Clean Indoor Air, I want to thank you for the opportunity of discussing several aspects of this important health issue. First and foremost I want to congratulate you, the chairman and the cosponsors. You are kind of first out of the chute in introducing a major piece of legislation on a new major health threat. The Council—and I want to volunteer our efforts in any way possible to help move this bill, and hopefully soon a House companion bill through the process—believes that in these times of budget constraints and bulging statutory mandates, without legislative authority there is little prospect for solving indoor pollution problems.

One of the fascinating aspects of this issue is, it is a new issue. We have a clean slate, and one of the things that we have trouble grappling with is the definition of the issue. In reading the findings of this bill and other popular brochures about the issue of indoor air quality, one typically finds a rundown of air pollutants. The problem with that definition is, it does not include a considerable portion of the issue. Indoor air quality is a human health issue with a myriad number of factors. Pollutants are one but not the entire problem. Building design is one, but not the entire aspect of the problem. We are dealing with a human health issue here, and we must fully define the issue with all of its aspects. If we don't fully define the issue, we stand precious little hope of fully solving the problem.

The second part of the definitional problem we have is defining what is not a health hazard. The good news is, not everything to do with indoor air is a problem. The bad news is, our technical knowledge is scarce enough, it is hard to say with certainty what really is to be included and not to be included. I will let other people talk more on the research side. Our organization is a policy organization and I would like to stick to that aspect.

At a minimum I see the Federal Government having four crucial roles in the issue. One is to conduct basic research. Two is to provide the carrots and sticks to other private and governmental organizations to do the task which they ought to be doing. The Federal Government is not going to solve the entire problem. It has to be a fairly large cooperative effort. Just as the problem is a complex mixture of different actors, the solution is a complex mixture of different actors.

The third Federal role is obviously to do its traditional regulatory functions when human health threats demand regulation.

The fourth is a role that people often don't associate with the Federal Government, and it is really more analogous to a private citizen role. The Federal Government is our Nation's largest landlord and it is one of the largest consumers of building-related products. Through its function as a landlord and through its function as a consumer, as opposed to its function as a government, it has a considerable role to play.

I would like to talk a little bit about the different roles and the different private actors. We have professional associations. Somebody mentioned standard-setting, and there is a very serious question whether the Government should be in the role of setting standards for different activities or whether professional associations, such as the gentleman from ASHRAE down the table there, should be worried about standards for ventilation, whether other professional associations, the architects should be worrying about design, other people should be worrying about different standards, procedures and protocols. I am not sure the Federal Government is the one that should be doing that. It is an open issue, but I think we should not assume that that is a Federal role.

Other private actors are the vendors, those who are going to be delivering diagnostic and remedial services. It seems to me the Federal Government has a tremendous role in creating a new industry, but the scope of the problem is such that the Federal Government cannot solve it. We have in this country a market-driven economy that has a wonderful way of producing what is needed, and what we need to do is take advantage of that system to get the services, the diagnostic and remedial services, available in an affordable fashion to the average homeowner and to those who have indoor air quality problems.

The third private side I would classify as product manufacturers. This goes back to, again, who the consumers of indoor air quality related products might be.

You have commercial building folks, the people who can afford to have industrial hygienists come in and diagnose and remediate their building, and these are the people who are leading the development of protocol, standards, and different procedures, technology.

You have hypersensitive individuals for whom cost is not such a factor, and they require different types of products. They require low toxic products. They need a cleaner environment. You can't ventilate it out. They just need to not have it, period.

And then the third is what I was leading to earlier, the Federal Government as a consumer and a landlord. One aspect of this bill which I want to wholeheartedly support is the concept of using Federal buildings. I think that concept might need a little fine-tuning, because what I would be interested in seeing is using the Federal Government as a model landlord: Talk landlord-to-landlord to the private folks in this country to develop procedures for management-occupant negotiation on design and use and management of buildings; use it to design techniques for diagnosing and remediating buildings; and also have the Federal Government in a consumer role use its market force—which I as an individual, if I walked into my local carpet store and asked for a low-toxic carpet, they would think I was nuts—the Federal Government buys yards and yards and truckloads of carpet. If they go in and they ask for a product, you can create a market by the Federal Government acting as a consumer that I acting as a consumer cannot do.

One issue—and there are lots of other things in the bill that we could talk about, some have been spoken to by others—two things I feel compelled to object to.

Senator CHAFEE. All in 30 seconds.

Mr. BOND. Okay. One is that they managed to write a 40-page bill on indoor air quality and never uttered the words "tobacco smoke." That is an unforgivable surrender to an industry that doesn't deserve that accommodation.

The other thing is that I believe it is a bureaucratic, burdensome, and it is kind of a paper blizzard in the making there. We finally have EPA in a position where they are ready to do something about the issue and, as I like to say, we are now asking them to write reports and serve coffee and doughnuts to the rest of the Federal Government. If we have them ready to do something, let's have them do something to improve the public health. Let's not have them conduct meetings and have them write reports.

Senator CHAFEE. Okay. Thank you very much.

Dr. Michael Hodgson.

STATEMENT OF DR. MICHAEL HODGSON, ENVIRONMENTAL HEALTH COMMITTEE, AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR CONDITIONING ENGINEERS, ACCOMPANIED BY MR. FRANK M. CODA, EXECUTIVE DIRECTOR

Dr. HODGSON. Thank you for the opportunity here to comment on the proposed legislation on indoor air quality. I speak here on behalf of the American Society of Heating, Refrigerating, and Air Conditioning Engineers, commonly known as ASHRAE, a technical society of some 53,000 individual members. Our membership is composed of consulting engineers, contractors, design professionals, and employees of academic and research institutions, manufacturers, and Government. I am director of the Occupational and Environmental Health Program at the University of Pittsburgh School of Medicine, and have been conducting research on indoor air quality problems since 1981, when I investigated the Humphrey Building here as an epidemic intelligence service officer for the Centers for Disease Control.

ASHRAE's business is simply occupant comfort in buildings, all the technical knowledge associated with providing that comfort, and the effects of that technology on the environment. Indoor air quality is a major focus of society activity and its Standard 62, "Ventilation for Acceptable Indoor Air Quality," is the only voluntary consensus standard available in the U.S. today to regulate the quality of the air indoors.

The complete written statement that was provided, provides more detail about ASHRAE and its related technical materials. Here I would like to direct my comments to the legislation under consideration by this committee.

Bill 1629 is a comprehensive bill directed at the broad indoor air quality problem. ASHRAE certainly supports such an effort. Two features of the bill I would like to emphasize, and then add two additional concerns for your consideration.

First, a major thrust of that bill is research. Government must take a leading role in research, particularly in the area of health effects and in the area of contaminant measures. The private sector will not be able to accomplish all of the research needed in those two areas, although the private sector is able to disseminate and apply the results of such research.

ASHRAE, for example, has a research program which is supported by the private sector. A portion of those research dollars are directed at indoor air quality, but ASHRAE focuses much more on buildings and building systems than on medical aspects and health effects.

Second, it is important that information on health effects and recommended exposure levels be disseminated to the user community. The health advisories provision, section 6 of the bill, will be an important vehicle in this regard. We interpret the term "advisories" to mean guidelines rather than regulations in most situations, which could then be used by the private sector to establish control levels by promoting good design practices or, when appropriate, by developing private sector consensus standards. Sections 7(c) and (d) support that activity.

Now I would like to address two additional aspects of the poor indoor air quality problem which you may wish to address in this proposed legislation. These points draw upon ASHRAE's experience in developing good design practices in the area of ventilation in buildings. The provisions of ASHRAE's Standard 62-81 are provided in the written comments, but our experience points out two important aspects which should be considered.

First, occupant health is not the only consideration when evaluating possible indoor air quality contaminants. ASHRAE's Standard 62 incorporates health information and control levels when available, but generally that standard is considered to be a comfort-based standard, that is, a standard that covers contaminants and conditions in buildings which may not be a health risk but may affect indoor air quality. A combination of low-level concentrations of certain substances may not pose an health risk in the traditional sense but may affect indoor air quality, resulting in annoyance and the perception of symptoms we call the sick building syndrome.

It is now generally accepted that discomfort in the work place significantly affects worker productivity and absenteeism. Studies have shown that buildings which do not have adequate temperature and relative humidity control may give rise to the perception of stuffy air, even when the air itself is relatively clean, as defined by the permissible exposure levels set by OSHA. Often, the problem has been associated with poor operation and poor maintenance practices. Buildings must be maintained and operated as designed to perform at desired levels.

Second, ASHRAE is concerned not only with the quality of the indoor environment but also in providing good indoor air quality in a cost effective and energy conserving manner. These two are very important considerations in achieving good indoor environments, and these two considerations influence many of the technological developments which will be needed.

Until contaminants that give rise to building-related complaints are identified, cost effective and energy conserving ventilation practices cannot be developed or validated. ASHRAE's Standard 90, "Energy Conservation in New Building Design," is a resource document for energy codes and standards in all 50 States. ASHRAE is very concerned about the Nation's future energy situation, and urges energy conservation in all buildings where possible.

Mr. Chairman, I refer you to the more detailed written statement and I applaud, on behalf of ASHRAE, your efforts on indoor air quality. A proposed expenditure each year of approximately $58 million would total about $1 per person in the United States for the entire 5-year period—20 cents a year for clean and healthful indoor air.

In summary, ASHRAE would encourage the committee to consider more than just health effects in classifying contaminants, and ask that the committee consider cost effectiveness and energy conservation when developing solutions to poor indoor air quality problems.

Senator MITCHELL. Thank you very much, Dr. Hodgson.

Senator Chafee.

Senator CHAFEE. Thank you, Mr. Chairman.

This is extremely interesting, I might say, and we may not have a torrent of questions for you but I think each of you have made us think about these problems. In this era where we are trying to conserve energy, as Dr. Hodgson mentioned, trying to design buildings that are comfortable for a good working atmosphere, enough humidity in the air, enough heat in it, and then we are confronted with this additional problem of having clean air in the buildings, it is something that I must say many of us haven't spent much time thinking of.

I think the point that Mr. Bond made about the Federal Government being an ideal landlord is important. We are big players and we can do something about non-toxic carpeting, as you mentioned.

Have any of you done any studies on the relationship, for example, between absenteeism and poor indoor air quality? Who can enlighten us on that?

Dr. WOODS. I will make one comment on that. There is not good information regarding the absenteeism. We recently published a paper at the International Congress on Building Energy Management that includes some calculations on that, and that is included in the testimony that I submitted as written.

But the point is that if energy conservation is done without consideration of the resultant environmental quality it can be counterproductive. What we found for example, is that a 25 percent energy savings that resulted in adverse environmental impact in an office building and caused a middle manager to lose one day a year because of illness or two minutes a day in lost concentration, would be counterproductive.

Conversely, there are methods—for example, better ventilation efficiency—that provide improved environmental quality and improved energy efficiency, and so I guess the point here is that it is not just the environmental quality, it is how it is accomplished that is important.

Senator CHAFEE. Yes. Well, that's the point Dr. Hodgson wanted to make, yes.

Dr. HODGSON. If I could make another comment to that, the impression you may have received from the three panels is that indoor air quality complaints are one set of problems. In fact, they are not. As Dr. Woods has pointed out, what is commonly termed the sick building syndrome is probably a collection of a large series of contaminants leading to complaints that are perceived the same way, which may have physiologically very different outcomes.

The Humphrey Building and some of the comfort problems were presented the same way, but one of them was in fact immunologic lung disease and most of them are not. At least that is our current thinking. There is no research being done or being funded on a Federal level, such as by the NIH or NIEHS, to sponsor such research, and therefore it is not being done.

Where problems like that occur, employees will frequently leave their jobs. In fact, in the Humphrey Building that had been the case for several years. I conducted actually the fourth health hazard evaluation for NIOSH from 1981 to 1983. When I went in there in 1981, three prior ones had occurred between 1976 and 1980.

Senator CHAFEE. Did you solve the problem?

Dr. HODGSON. We identified the problem, in fact. But by the time we identified the problem, several Ph.D.-level advisors to Dr. Brandt at the time had left, and so what may not show up as building illness and lost time nevertheless results in higher employee turnover, in loss of individuals with great talent, things that may not be——

Senator CHAFEE. Now Mr. Merrill from Maine was testifying earlier about the dangers from certain air conditioning systems getting into the air and affecting people. I have always felt that, for instance, hospitals were one of the most dangerous places in the world to be. I presume that is all true, isn't it, that these—what's the word I am looking for?—get into the systems.

Mr. BOND. Microbials?

Senator CHAFEE. Yes. I think he was talking about——

Dr. HODGSON. Bacteria.

Senator CHAFEE. Bacteria. Bacteria is the word I'm looking for. Bacteria get into the air-conditioning systems. Now you are in the air conditioning business, or you are representing them, Dr. Hodgson. What about that? How do you clean up these systems? Inadequate maintenance does all these things that Mr. Merrill touched on?

Dr. HODGSON. There are really two separate parts in your question, first, hospitals alone as generators of disease and, second, the issue of ventilation systems per se. Hospitals have gone in general to one-pass systems, meaning they take outside air, suck it through and distribute it. There were several outbreaks of infectious diseases at the National Institutes of Health that were transmitted through recirculating systems, and so many hospitals have gotten away from that.

The more important question——

Senator CHAFEE. I don't want to concentrate on hospitals because they are a problem unto themselves, but just take the situation of Mr. Merrill. He represents the State employees of New Hampshire and Maine as well, and so you have some bacteria in the system. Now it all made sense to me, and I assume that he is right, that it does occur. Is that correct?

Dr. HODGSON. ASHRAE agrees that until we know what exactly causes problems, we can't fix them. If the problem comes from bacteria and mold growing on fibers lining the inside of ventilation ducts, and those are disseminated to building occupants, we need a very different filtration system than if the problem is generated from the sumps in the central cooling system. You have to place your filter in a different place, or if the problem comes from lined ducts, one may have to take the lining from the inside of ducts and put it on the outside of ducts to prevent their contamination.

The problem may well, in fact, come from mold growth on the inside of ducts, but not all problems come from that, as Dr. Woods had pointed out, and there is no systematic program to identify where those problems come from.

Senator CHAFEE. Well, thank you, Mr. Chairman. I must say we stagger from one danger to another in our lives, don't we. I am just looking around this room, and ready to flee outside.

It's a whole new sense of awareness, and I think these hearings have been useful and commend you for conducting them. The testimony we have received has been very helpful, and I want to thank each of you as witnesses.

Senator MITCHELL. Thank you very much, Senator Chafee.

Gentlemen, thank you very much. We look forward to working with you and others in moving this important legislation forward.

The hearing is concluded.

[Whereupon, at 11:21 a.m., the subcommittee adjourned subject to the call of the Chair.]

[Statements submitted for the record and the bill, S. 1629, follow:]

STATEMENT
OF
J. CRAIG POTTER
ASSISTANT ADMINISTRATOR
OFFICE OF AIR AND RADIATION
U.S. ENVIRONMENTAL PROTECTION AGENCY

BEFORE THE

SUBCOMMITTEE ON ENVIRONMENTAL PROTECTION
OF THE
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

UNITED STATES SENATE

NOVEMBER 20, 1987

GOOD MORNING. I AM CRAIG POTTER, ASSISTANT ADMINISTRATOR FOR THE OFFICE OF AIR AND RADIATION AND RESPONSIBLE FOR EPA'S INDOOR AIR PROGRAM. I'M PLEASED TO BE HERE THIS MORNING TO SHARE WITH YOU EPA'S VIEWS ON S. 1629, THE INDOOR AIR QUALITY ACT OF 1987.

I'D LIKE TO BRIEFLY OUTLINE OUR CURRENT ORGANIZATION AND STRATEGY ON INDOOR AIR QUALITY BEFORE I COMMENT ON THE SPECIFIC PROVISIONS OF THE BILL. SEVERAL OFFICES WITHIN EPA ARE HEAVILY INVOLVED IN INDOOR AIR ACTIVITIES RANGING FROM RESEARCH TO BOTH REGULATORY AND NON-REGULATORY PROGRAMS TO DEAL WITH INDIVIDUAL POLLUTANTS OR POLLUTANT MIXTURES.

THE OFFICE OF RESEARCH AND DEVELOPMENT IS CHARGED WITH CARRYING OUT THE RESEARCH PROGRAM MANDATED BY TITLE IV OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) AND WE HAVE JUST RECENTLY CREATED A SPECIAL PANEL OF THE SCIENCE ADVISORY BOARD TO ASSIST THEM IN CARRYING OUT THIS MANDATE.

THE OFFICE OF PESTICIDES AND TOXIC SUBSTANCES (OPTS) ADMINISTERS THOSE STATUTES DEALING WITH PESTICIDES AND TOXIC CHEMICALS AND ALONG WITH THE OFFICE OF DRINKING WATER (ODW) ACCOUNTS FOR MOST OF THE REGULATORY PROGRAMS ADDRESSING INDOOR EXPOSURES TO TOXIC CHEMICALS.

WITHIN THE OFFICE OF AIR AND RADIATION (OAR), THE OFFICE OF RADIATION PROGRAMS (ORP) IMPLEMENTS THE RADON ACTION PROGRAM WITH WHICH ALL OF YOU ARE FAMILIAR. ALSO WITHIN OAR IS THE INDOOR AIR STAFF, WHOSE RESPONSIBILITIES INCLUDE COORDINATING THESE MYRIAD ACTIVITIES, FORMULATING AGENCY INDOOR AIR POLICY, ASSISTING IS SETTING THE RESEARCH AGENDA, AND DEVELOPING AND DISSEMINATING INFORMATION ON INDOOR AIR POLLUTION.

OUR OVERALL STRATEGY IN ADDRESSING INDOOR AIR QUALITY PROBLEMS IS THREEFOLD. FIRST, THROUGH OUR RESEARCH PROGRAM WE ARE SEEKING TO FILL THE MANY GAPS IN OUR KNOWLEDGE ABOUT PEOPLES' EXPOSURE TO POLLUTANTS IN THE INDOOR ENVIRONMENT, THE HEALTH EFFECTS OF THAT EXPOSURE, AND WAYS TO MITIGATE RISKS TO HUMAN HEALTH. WHILE WE ARE CERTAINLY CONCERNED WITH POTENTIAL CANCER-CAUSING AGENTS, WE ARE ALSO PLACING INCREASING EMPHASIS ON UNDERSTANDING THE MORE IMMEDIATE COMPLAINTS WHICH PEOPLE ARE DEALING WITH IN EXISTING BUILDINGS. WE ANTICIPATE THAT RESEARCH INTO INDOOR AIR QUALITY PROBLEMS WILL BE AN ON-GOING EFFORT CONSISTENT WITH THE BASIC AGENCY ROLE OF PROVIDING TECHNICAL ASSISTANCE AND INFORMATION ON ENVIRONMENTAL ISSUES OF THIS NATURE.

SECOND, WE WILL CONTINUE TO VIGOROUSLY EXERCISE OUR REGULATORY AUTHORITIES UNDER THE TOXIC SUBSTANCES CONTROL ACT (TSCA), THE

FEDERAL INSECTICIDE, FUNGICIDE, AND RODENTICIDE ACT (FIFRA), THE SAFE DRINKING WATER ACT (SDWA), AND OTHER STATUTES TO CONTROL SPECIFIC POLLUTANTS WHICH HAVE BEEN SHOWN TO POSE UNACCEPTABLE RISKS ON A NATIONAL BASIS.

THIRD, WE WILL CONTINUE TO UTILIZE NON-REGULATORY PROGRAMS AS APPROPRIATE TO ADDRESS INDOOR AIR QUALITY PROBLEMS. AS HAS BEEN DEMONSTRATED IN ADDRESSING THE RISKS FROM RADON, NON-REGULATORY ACTIVITIES ARE SOMETIMES THE MOST EFFECTIVE APPROACH TO SOLVING INDOOR AIR QUALITY PROBLEMS. THESE ACTIVITIES INCLUDE BUILDING EFFECTIVE PARTNERSHIPS WITH OTHER FEDERAL AGENCIES, THE STATES, LOCAL GOVERNMENTS, AND THE PRIVATE SECTOR AND DISSEMINATING INFORMATION ON INDOOR AIR RISKS AND RISK REDUCTION STRATEGIES.

WHILE CERTAIN ASPECTS OF S. 1629 ARE CONSISTENT WITH THE STRATEGY WE ARE PURSUING ON INDOOR AIR, WE HAVE SEVERAL CONCERNS WITH RESPECT TO THE TIMING OF THIS LEGISLATION AS WELL AS THE RESOURCE AUTHORIZATIONS AND SUBSTANCE OF CERTAIN PROVISIONS OF THE BILL. WE THEREFORE CANNOT SUPPORT THE LEGISLATION.

OUR FIRST CONCERN IS WITH THE TIMING OF THIS BILL. SARA TITLE IV, PASSED ONLY A YEAR AGO, SPECIFICALLY REQUIRES THAT EPA, AMONG OTHER THINGS, EVALUATE THE APPROPRIATE FEDERAL ROLE IN INDOOR AIR QUALITY AND MAKE RECOMMENDATIONS IN A REPORT TO CONGRESS WHICH IS NOT DUE FOR ANOTHER YEAR. UNTIL SUCH TIME AS WE ARE ABLE TO COMPLETE ANALYSES OF THE ADEQUACY OF EXISTING REGULATORY AND OTHER AUTHORITIES FOR DEALING WITH INDOOR AIR POLLUTION, WE WOULD BE RELUCTANT TO ENDORSE NEW LEGISLATION OF ANY SORT.

OF EQUAL CONCERN ARE THE RESOURCE LEVELS THAT WOULD BE

AUTHORIZED IN THE BILL. WHILE WE WOULD AGREE THAT CURRENT DATA ON INDOOR AIR POLLUTION RISKS INDICATES THAT A SIGNIFICANT RESEARCH AND INFORMATION DISSEMINATION PROGRAM SHOULD BE CONDUCTED, WE BELIEVE THAT THE AUTHORIZATION LEVELS CONTAINED IN THE BILL FAR EXCEED BOTH THE NEED AS WELL AS OUR ABILITY TO EFFICIENTLY MANAGE A HUGE INCREASE -- FROM JUST OVER $3 MILLION PER YEAR TO $58 MILLION PER YEAR.

I'D LIKE TO TURN NOW TO SOME OF THE PROVISIONS IN THE BILL AND DISCUSS SOME OF THOSE AREAS WHICH ARE CONSISTENT WITH OUR OWN STRATEGY AS WELL AS THOSE AREAS WHICH WE BELIEVE POSE PROBLEMS.

OUR TOP INDOOR AIR PRIORITY AT EPA IS TO BETTER UNDERSTAND THE MANY COMPLEX COMPONENTS OF THE INDOOR AIR PROBLEM SO THAT EFFECTIVE MITIGATION STRATEGIES CAN BE DEVELOPED. THE 16 SPECIFIC AREAS OF RESEARCH IDENTIFIED IN SECTION 5 OF THE BILL ARE PRETTY MUCH ON TARGET AS FAR AS IDENTIFYING THE AREAS WHERE RESEARCH MAY BE APPROPRIATE. NEVERTHELESS, WE DO NOT BELIEVE THAT THIS PROVISION IS REALLY NECESSARY SINCE OUR CURRENT RESEARCH AUTHORITY UNDER TITLE IV IS VERY BROAD AND WE OBJECT TO THE MANDATORY NATURE OF THE PROVISION. MOREOVER, WE BELIEVE THAT THE AUTHORIZATION LEVELS FOR THIS PROVISION ARE EXCESSIVE.

THE TECHNOLOGY DEMONSTRATION PROGRAM CALLED FOR IN SECTION 5(C) HAS MERIT BUT WE BELIEVE IT IS OVERFUNDED AND SHOULD BE MADE ENTIRELY DISCRETIONARY.

SECTION 6 OF THE BILL WOULD REQUIRE EPA TO ESTABLISH A LIST OF CONTAMINANTS THAT MIGHT REASONABLY BE EXPECTED TO

OCCUR IN INDOOR AIR AND TO PUBLISH TWELVE HEALTH ADVISORIES WITHIN THREE YEARS WHICH, AMONG OTHER THINGS, WOULD ESTABLISH "NO EFFECT" LEVELS FOR THESE POLLUTANTS, WITH AN ADEQUATE MARGIN OF SAFETY. WE DO NOT BELIEVE THAT THE HEALTH ADVISORY APPROACH OUTLINED IN THE BILL IS ALWAYS THE MOST EFFECTIVE WAY TO COMMUNICATE RISKS AND RISK MITIGATION INFORMATION TO THE PUBLIC FOR MANY INDOOR AIR QUALITY PROBLEMS.

I WOULD HASTEN TO ADD, HOWEVER, THAT WE DO BELIEVE VERY STRONGLY THAT EPA HAS A RESPONSIBILITY TO ASSESS RISKS FROM POLLUTANT SOURCES IN ALL MEDIA AND TO DECIDE UPON EITHER A REGULATORY OR NON-REGULATORY COURSE OF ACTION. EPA MUST, TO THE BEST OF ITS ABILITY, COMMUNICATE INFORMATION ON THOSE RISKS AND RISK MITIGATION TECHNIQUES TO THE PUBLIC. WE THINK WE'VE DONE A GOOD JOB IN UTILIZING NON-REGULATORY APPROACHES FOR INDOOR POLLUTANTS SUCH AS RADON. IN ADDITION, WE HAVE A RESPONSIBILITY TO REGULATE INDIVIDUAL POLLUTANTS UNDER A VARIETY OF STATUTES AND WE HAVE TAKEN A NUMBER OF ACTIONS TO CONTROL INDOOR AIR EXPOSURES TO VARIOUS CHEMICALS. THESE ACTIONS INCLUDE THE CANCELLATION OF THE PESTICIDE LINDANE, THE VOLUNTARY CANCELLATION OF THE TERMITICIDE CHLORDANE, AND THE PROPOSED ASBESTOS BAN AND PHASEOUT RULE.

WE DO NOT BELIEVE THAT SIMPLY PUBLISHING A LIST OF ALL CONTAMINANTS THAT MAY BE FOUND IN INDOOR AIR SERVES A PARTICULARLY USEFUL PURPOSE, ESPECIALLY IN THE ABSENCE OF HEALTH-BASED CRITERIA FOR LISTING AND IN LIGHT OF THE MANY THOUSANDS OF CHEMICALS THAT COULD MEET THE DEFINITION OF CONTAMINANT, ALTHOUGH THEY MAY ACTUALLY BE PRESENT AT VERY

LOW LEVELS.

WE ARE ALSO CONCERNED BY THE REQUIREMENT TO ESTABLISH "NO EFFECT" LEVELS FOR SPECIFIC POLLUTANTS. AS YOU KNOW, A ZERO RISK OR "NO EFFECT" LEVEL FOR A CARCINOGEN IS ZERO, A LEVEL WHICH IN MANY CASES IS NOT ONLY UNATTAINABLE, BUT OFTEN BELOW BACKGROUND LEVELS. WE HAVE RESISTED SUCH AN APPROACH FOR RADON BECAUSE WE DO NOT BELIEVE THAT AN UNATTAINABLE STANDARD SERVES ANYONE'S INTEREST. FOR NON-CANCER ENDPOINTS, ESTABLISHING NO-EFFECT LEVELS IS SOMEWHAT LESS PROBLEMMATIC ALTHOUGH A HIGH LEVEL OF SCIENTIFIC UNCERTAINTY REMAINS FOR MOST INDOOR AIR CONTAMINANTS. FINALLY, WE ARE CONCERNED THAT BY FOCUSING THE AGENCY'S INDOOR AIR PROGRAM FOR THE NEXT THREE YEARS ON TWELVE SPECIFIC POLLUTANTS, WE WILL BE NEGLECTING

STRATEGIES WHICH MAY IN THE LONG RUN PROVE MORE IMPORTANT IN REDUCING RISKS FROM INDOOR AIR POLLUTION SINCE THEY CAN ADDRESS MULTIPLE POLLUTANTS SIMULTANEOUSLY.

BECAUSE OF THE BUILDING-BY-BUILDING NATURE OF THE INDOOR AIR PROBLEM, WE BELIEVE THAT SIGNIFICANT INVOLVEMENT BY STATE AND LOCAL GOVERNMENTS WILL LIKELY BE NECESSARY IN ADDRESSING ANY IDENTIFIED INDOOR AIR QUALITY PROBLEMS. AT THE SAME TIME, HOWEVER, WE DO NOT BELIEVE THAT WE ARE FAR ENOUGH ALONG IN CHARACTERIZING THE PROBLEM TO WARRANT EVEN A LIMITED GRANT PROGRAM.

I'D LIKE TO TURN NOW TO THOSE COMPONENTS OF THE BILL DEALING WITH FEDERAL BUILDINGS. BOTH THE FEDERAL BUILDING DEMONSTRATION PROGRAM CONTAINED IN SECTION 11 AND THE FEDERAL BUILDING RESPONSE PLANS CALLED FOR IN SECTION 7(E) ATTEMPT TO

DEAL WITH THE ISSUE OF FEDERAL BUILDINGS WITH INDOOR AIR PROBLEMS. THIS ISSUE WAS ALSO RAISED REPEATEDLY BY PARTICIPANTS IN A RECENT POLICY FORUM ON INDOOR AIR QUALITY WHICH MY OFFICE SPONSORED ALONG WITH THE NATIONAL COUNCIL FOR CLEAN INDOOR AIR. WE AGREE THAT WHEN IT IS DETERMINED THAT A SPECIFIC FEDERAL BUILDING HAS AN IDENTIFIED INDOOR AIR QUALITY PROBLEM, THAT THE FEDERAL GOVERNMENT SHOULD TAKE STEPS TO REMEDY THE PROBLEM.

NEVERTHELESS, WE DON'T THINK THE .5% SET-ASIDE FOR CONSTRUCTION OF NEW FEDERAL BUILDINGS OR THE REQUIREMENT THAT EPA PREPARE INDIVIDUAL RESPONSE PLANS FOR EACH FEDERAL BUILDING THAT MAY EXCEED A PRE-ESTABLISHED LEVEL FOR A SPECIFIC CONTAMINANT IS THE BEST WAY OF GOING ABOUT IT. THE .5% SET-ASIDE WOULD NOT ADDRESS PROBLEMS IN EXISTING BUILDINGS AND COULD PROVE TO BE AN UNREASONABLY EXPENSIVE PROPOSITION IN MANY FEDERAL CONSTRUCTION PROJECTS.

WE ARE ALSO VERY CONCERNED THAT A REQUIREMENT TO PREPARE INDIVIDUAL RESPONSE PLANS FOR EACH FEDERAL BUILDING WHICH MAY EXCEED A LEVEL ESTABLISHED UNDER SECTION 109 OR 112 OF THE CLEAN AIR ACT OR AN ADVISORY CONCENTRATION TO BE ESTABLISHED UNDER SECTION 6 OF THIS BILL WOULD VERY QUICKLY GET OUT OF HAND FROM A RESOURCE STANDPOINT. GIVEN THE LIKELIHOOD THAT A LARGE NUMBER OF BUILDINGS MAY EXCEED A "NO EFFECT" LEVEL AT SOME TIME, A RESPONSE PLAN MIGHT BE NECESSARY FOR MOST FEDERALLY-OWNED BUILDINGS. WHILE A RELIABLE ESTIMATE OF THE TOTAL NUMBER OF FEDERALLY-OWNED BUILDINGS IS NOT AVAILABLE, IT IS

POSSIBLE THAT THERE ARE SEVERAL HUNDRED THOUSAND FEDERALLY-OWNED BUILDINGS.

AS YOU MAY BE AWARE, THE GENERAL SERVICES ADMINISTRATION (GSA) IS NOW IN THE PROCESS OF FORMULATING AN INDOOR AIR QUALITY POLICY AND GUIDELINES TO ENSURE ACCEPTABLE INDOOR AIR QUALITY IN EXISTING FEDERAL BUILDINGS. EPA, ALONG WITH OTHER FEDERAL AGENCIES HAVE BEEN INVOLVED WITH GSA IN THEIR PROCESS AND WE EXPECT TO PARTICIPATE IN ANOTHER REVIEW OF THE GUIDELINES BEFORE THEY ARE FINALIZED SOMETIME IN THE SPRING OF 1988. WITH RESPECT TO EXISTING BUILDINGS, WE BELIEVE THESE GUIDELINES SHOULD BE GIVEN A CHANCE TO BE IMPLEMENTED BY INDIVIDUAL BUILDING MANAGERS BEFORE IMPOSING A COSTLY RESPONSE PLAN REQUIREMENT ON EPA.

DESPITE OUR SERIOUS CONCERN OVER THE REQUIREMENT TO DEVELOP INDIVIDUAL BUILDING RESPONSE PLANS, WE DO AGREE THAT THERE IS A NEED TO DEVELOP AND PERIODICALLY UPDATE A COMPREHENSIVE PLAN THAT INTEGRATES THE VARIOUS FEDERAL REGULATORY AND NON-REGULATORY INDOOR AIR QUALITY PROGRAMS.

SECTION 10 OF THE BILL WOULD ELEVATE THE EXISTING INTERAGENCY COMMITTEE ON INDOOR AIR QUALITY (CIAQ) TO THE EXECUTIVE OFFICE OF THE PRESIDENT. WHILE WE WOULD BE THE FIRST TO AGREE THAT THE CIAQ HAS NOT ALWAYS BEEN AS PRODUCTIVE AS WE WOULD LIKE, WE HAVE TAKEN STEPS RECENTLY TO REAFFIRM OUR COMMITMENT TO THE CIAQ. A CIAQ WORKGROUP IS NOW CHARGED WITH DEVELOPING A COMPREHENSIVE STATEMENT OF INDOOR AIR QUALITY RESEARCH NEEDS FOR INCORPORATION INTO THE 1988 INDOOR AIR REPORT TO CONGRESS REQUIRED UNDER SARA SECTION 403(E). A NUMBER

OF OTHER INTERAGENCY COOPERATIVE EFFORTS ARE ALSO UNDERWAY. WE DON'T BELIEVE THAT ELEVATING THE INTERAGENCY COORDINATION FUNCTION WILL ENHANCE COORDINATION AT THE STAFF AND PROJECT LEVEL, WHERE THE GREATEST NEED FOR COORDINATION EXISTS. FURTHERMORE, WE ARE CONCERNED THAT ESTABLISHING AN INDEPENDENT STAFF FOR THE INTERAGENCY COORDINATING FUNCTION WITH SUCH A LARGE BUDGET WILL ONLY SERVE TO MUDDY THE ISSUE OF WHO IS LEADING THE FEDERAL EFFORT ON INDOOR AIR QUALITY AT THE SAME TIME THAT THE BILL ATTEMPTS TO CLARIFY THIS ISSUE. DESPITE THESE CONCERNS, HOWEVER, WE DO AGREE THAT THE INTERAGENCY COORDINATING FUNCTION IS EXTREMELY IMPORTANT.

MY FINAL COMMENT ADDRESSES THE CONCEPT OF ESTABLISHING A CLEARINGHOUSE FOR INDOOR AIR QUALITY INFORMATION. ALTHOUGH OVERFUNDED, WE SUPPORT THIS PROVISION IN PRINCIPLE AS A USEFUL MECHANISM FOR ENSURING THAT SCIENTIFIC AND OTHER INFORMATION IS MADE AVAILABLE TO THE MANY SOCIETAL SECTORS THAT ARE IN NEED OF THE MOST CURRENT INFORMATION ON INDOOR AIR QUALITY.

IN CONCLUSION, WE THINK THAT THE EXISTING TITLE IV PROVIDES ADEQUATE AUTHORITY TO CARRY OUT AN EFFECTIVE RESEARCH AND INFORMATION DISSEMINATION PROGRAM BUT THAT CERTAIN ASPECTS OF S.1629 ARE NOT INCONSISTENT WITH THE AGENCY'S CURRENT INDOOR AIR RESEARCH AND PROGRAM ACTIVITIES. WE ARE MAKING PROGRESS ON INDOOR AIR POLLUTION AND WE ARE COMMITTED TO CONTINUING THAT EFFORT INTO THE FUTURE. WE LOOK FORWARD TO A CONSTRUCTIVE DIALOGUE WITH THIS COMMITTEE AS IT CONTINUES ITS DELIBERATIONS ON S.1629.

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AMERICAN LUNG ASSOCIATION
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STATEMENT OF ALFRED MUNZER, M.D.

ON BEHALF OF

THE AMERICAN LUNG ASSOCIATION

TO THE

SUBCOMMITTEE ON ENVIRONMENTAL PROTECTION
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE

RE: THE INDOOR AIR QUALITY ACT OF 1987

NOVEMBER 20, 1987

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Mr. Chairman and members of the Subcommittee, I am Dr. Alfred Munzer, Director of Critical Care at Washington Adventist Hospital and in the active practice of pulmonary medicine. I am pleased to appear before you today on behalf of the American Lung Association. ALA is the nation's oldest voluntary health oganizaion and is dedicated to the prevention and control of lung disease. The ALA, along with its medical section, the American Thoracic Society, has long recognized the contribution of air pollution, both indoors and outdoors, to the development of lung disease. The ALA has been implementing programs to ensure healthful air quality since 1966.

Traditionally we have believed that air pollution is primarily an outdoor problem and that the indoor environment provides protection from outdoor air pollution. However, the indoor environment is perhaps more polluted than the outdoor environment, and the causes and effects less well investigated and understood than the particular problems of the outdoor environment. The average person spends from 75% to 90% of the time in this potentially unhealthful environment. The magnitude and severity of this public health problem has been worsened by energy-conserving practices and the increased use of certain building materials and consumer products.

Although indoor air pollution has been recognized as a public health problem similar to outdoor air pollution, the federal government has failed to act to protect public health. To date no single federal agency has been given the jurisdiction for ensuring healthful air quality in the nonworkplace indoor environment. A range of federal agencies have partial authority resulting in unacceptable inaction on the part of the government.

The design of effective programs for the control of human exposures is a difficult task. The ALA believes there is sufficient knowledge about the health risks of indoor air pollution to warrant federal intervention. EPA, to date, has addressed the problem of indoor air pollution through the provision of information leaving the resolution of the problem to the individual. There is a need for government intervention--similar to ambient air pollution, exposure to indoor air pollution is involuntary for the most part and individual responsibility for the control of exposures is limited. The Indoor Air Quality Act of 1987 introduced by you, Mr. Chairman, with the support of many of the Committee members, is a positive step towards shaping the appropriate regulatory approach for the federal government. It is clear that as the program progresses additional effort will be needed.

S. 1629 represents a carefully constructed approach for initiating the federal government's program to control indoor air pollution. The bill establishes a research program to continue the identification and characterization of the problem as well as provision for technology development for the control of indoor air pollution. The bill creates a grant program to states for the assessment and management of specific indoor air pollution problems--a provision critical to the ability of the government to address the range of indoor air pollution problems. Finally, the bill requires EPA to develop a National Indoor Air Quality Response Plan to describe the actions to be taken to control indoor air pollution exposures.

The ALA offers the following comments regarding specific provisions of S. 1629:

o **Sec. 5: Indoor Air Quality Research**

The specific objective for research conducted under this section should be the compilation of information necessary to enable the Agency to proceed with tasks required by other sections including the Contaminant Health Advisories. Therefore, research activity to develop better methods for detecting and quantifying truly dangerous chemicals is needed. Equally important is research into and the application of new techniques in epidemiology to address the problem of low and chronic dose exposures.

We would further suggest specific reference requiring EPA collaboration with the National Institute for Environmental Health Sciences. This Institute is responsible for the Biometry and Risk Assessment Program, the National Toxicology Program, and the Toxicology Research and Testing Program, all of which address the wide variety of problems directly related to evaluating the human health effects of most of the identified major toxics in the indoor environment.

o **Sec. 6: Indoor Air Contaminant Advisories**

In our opinion, a primary function of any indoor air pollution control program is the provision of health effects information. This legislation carefully crafts a mechanism for developing health advisories with a dual purpose--information to state and local officials for use in their control activities and information to the public to facilitate their understanding of the problem and need for mitigation measures.

We endorse the compilation of a list of contaminants and stress the importance of public participation in the development of the list. It is critical that the advisory be prepared with the public in mind to facilitate understanding of the information and its use. In this regard, the advisory must carefully and concisely state where there is no known safe concentration for a particular pollutant--especially for known or suspected human carcinogens. Although not specificly noted, we would also recommend the advisory also state recommended mitigation measures where they exist.

Because of the critical need for the information which will be contained in the health advisories, we would recommend a more rapid timeframe for development of the advisories. In this regard we would also suggest that during revision of advisories due to new scientific information, the Agency be directed to consider an addendum to the existing advisory where practicable rather than complete revision. As is now the case with National Ambient Air Quality Standards, the complete revision is lengthy and costly and not always necessary.

o **Sec. 7: National Indoor Air Quality Response Plan** This section utilizes primarily existing authorities to allow the Agency to take action and requires the Agency to delineate a plan outlining such actions. Information dissemination and technical assistance activity are also addressed. In suggesting possible actions not specifically noted, we would recommend that the Agency consider immediate as well as long term actions. For example, the phase-down or phase-out of a particular contaminant can have immediate results in terms of human exposures. Long term actions may address technology development mechanisms.

o **Sec. 8: State and Local Air Quality Programs** Recognizing innovative activity by state and local governments, S. 1629 provides for grant programs in management and assessment, and response. The ALA supports the inclusion of this section and commends the author for providing for public comment on the management and assessment strategies. Such comment should also be allowed on the response program.

We would recommend addition of a requirement for summary reports to Congress specific to the status and results of this grant program. Further, such reports should also be made available to state and local governments and the general public as part of the Agency information and education activities.

o **Sec. 10: National Indoor Air Quality Council**

The legislation provides for the creation of a National Indoor Air Quality Council within the Executive Office of the President to provide for coordination of all federal agency activity. We would recommend the addition of representatives from National Institute for Evnironmental Health Sciences and the National Institute for Occupational Safety and Health.

* * *

In summary, Mr. Chairman, S. 1629 creates a program that is scientifically sound and a reasonable approach to the range of health effects caused by indoor air pollution. There is sufficient knowledge about the health risks of indoor air pollution that federal intervention can no longer be avoided. As we have advised about outdoor air pollution, we cannot wait for all of the answers before we take action--the American public deserves a safe and healthful environment, indoor and outdoors.

CFA Consumer Federation of America

TESTIMONY OF

STEPHEN BROBECK

EXECUTIVE DIRECTOR

CONSUMER FEDERATION OF AMERICA

before the

SUBCOMMITTEE ON ENVIRONMENTAL PROTECTION

OF THE SENATE COMMITTEE ON ENVIRONMENT

AND PUBLIC WORKS

HONORABLE GEORGE J. MITCHELL, CHAIRMAN

on

S.1629: "INDOOR AIR QUALITY ACT

of 1987"

November 20, 1987

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Mr. Chairman and Members of the Subcommittee, I am Stephen Brobeck, Executive Director of the Consumer Federation of America. CFA represents over 230 local, state and national organizations with a combined membership of 50 million people.

I want to thank you, Mr. Chairman and Members of the Subcommittee, for the opportunity to testify here today in support of S.1629, the "Indoor Air Quality Act of 1987". I also want to thank you for your vigorous leadership in focusing the Senate's attention on indoor air pollution, a critical health issue for this nation. We strongly endorse S.1629 as a measured, comprehensive approach to addressing indoor air quality and making it a national priority.

Indoor air quality is a key health and safety priority for CFA. For many years now, we have perceived indoor air pollution as the number one hidden health threat to our nation, where people are estimated to spend as much as 90% of their time indoors. This nation has spent billions of dollars to improve the quality of outdoor air. Yet, until relatively recently, indoor air pollution has received little national attention. Even the Environmental Protection Agency (EPA) recently concluded that, despite the magnitude of the health risk posed, the agency fails to give indoor air pollution commensurate priority.

Because of your efforts Mr. Chairman and the efforts of members of this Subcommittee, this has begun to change. S.1629 represents an important step toward elevating indoor air quality to the national priority it should be. The bill in fact represents a compromise in terms of a regulatory scheme. It does not establish enforceable standards nor does it afford new regulatory authority. Rather it recognizes the need for clear leadership - and action - by the Environmental Protection Agency. It provides the agency with both adequate resources and needed direction. S.1629 expands and focuses current research efforts at EPA and significantly advances the dissemination of vital health information to the experts in the field and to the public - through its national response plan, contaminant health advisories and information clearinghouse. Importantly, it crafts a strategy to improve coordination among federal agencies with indoor air responsibilities and by creating a national council within the Executive Office of the President, signifies the relative importance of addressing indoor air quality.

Controlling indoor air pollution necessitates effective federal leadership. The public has looked to EPA; yet until last year's Superfund Amendments and Reauthorization Act (SARA), there were questions still being raised within EPA as to even its research authority for indoor air. S.1629 now clarifies that EPA not only has the research authority for indoor air quality, but that it also has a mandate to act.

EPA is the logical designee as the lead agency for indoor air. It has the experience in complex regulation of air quality under the Clean Air Act, the capacity for consumer education, and research efforts underway in response to SARA. However, it is clear that EPA must work carefully with the other federal agencies to achieve a comprehensive response. A key effect of this bill is to focus more substantial EPA and federal attention on finally translating current information into action and on setting priorities.

I would like to briefly offer the following comments on specific provisions of the bill:

* Section 6: Indoor Air Contaminant Health Advisories

We support the concept of indoor air contaminant health advisories as set forth in Section 6. As we indicated earlier, this is a measured approach, developed in lieu of enforceable standards. The benefits of these advisories are two-fold: (1) they provide guidelines and important information to state and local officials in developing indoor air strategies and facilitating public understanding, and (2) they direct EPA to set necessary priorities to develop action on known contaminants.

Risks from exposure to indoor air pollutants do need to be communicated and can be done without needlessly scaring the consumer. The public is capable of understanding risks from exposure and these health advisories are a reasonable means to that end. However, in addition to communicating when there is a problem, it is also important to communicate what to do, i.e. mitigation techniques. Thus, these health advisories should clearly couple mitigation information with risk data, if they are to be useful and effective for the public.

Integral to these advisories is the need for health-effects data. By forcing EPA to produce these advisories, this provision should also force EPA to spend more time and resources on health based research. To this end, we would recommend that EPA be required to work directly with the Department of Health and Human Services for the development of epidemiological and human studies on the health effects of indoor air pollution.

* Section 10: National Indoor Air Quality Council

Indoor air quality responsibilities span at least eight key federal agencies. Coordination among these agencies for research and action -- outside of EPA -- is critical if we are to assure the most effective use of taxpayer dollars in this effort. We support the creation of this Council within the Executive Office of the President to ensure this coordination and the provision of adequate resources to carry through with its tasks. Further, the creation of this Council clearly identifies indoor air quality as a national priority and signals to the American public that it must begin to pay attention.

To assure adequate emphasis on health research, we would urge the inclusion of representatives from the specific health research institutes within the Department of Health and Human Services. We also recommend that a strong emphasis be placed on the relatively important role of those agencies concerned with controlling sources of indoor air pollutants, particularly the Consumer Product Safety Commission.

* Section 12: National Indoor Air Quality Clearinghouse

The proposed clearinghouse is an important aspect of this legislation. It is very hard to dispute the need to provide objective and consistent information to the consumer, to local, state and national agencies, to health professionals, to architects and builders, and to industry. The clearinghouse will certainly serve that function. To maximize its effectiveness, we would recommend that the bill include the provision for a "consumer hot-line". This would facilitate dissemination of non-technical information to consumers.

* Section 14: Authorizations

In effect, pennies have been allocated to this problem which costs society billions of dollars. EPA now estimates that indoor air pollutants (exclusive of radon) are responsible for as many as 3500 to 6500 cancer deaths annually. Indoor air pollutants also are known to cause millions of illnesses every year, which alone cost this nation tens of billions of dollars in medical expenses and lost wages. Without an adequate allocation of resources, this long-overdue strategy to finally address indoor air quality in a thoughtful and comprehensive fashion will fail.

Conclusion

While there is clearly far more work ahead in terms of research and the application of technology, S. 1629 is a sound and reasoned approach to begin reducing exposures to indoor air pollutants -- in the home and in the work place. We strongly support this measure and urge its quick passage.

CFA

Consumer Federation of America

December 23, 1987

The Honorable George Mitchell
Chairman, Environmental Protection Subcommittee
United States Senate
Washington, D.C. 20510

Dear Senator Mitchell:

During my testimony before your subcommittee concerning S. 1629, the "Indoor Air Quality Act of 1987", I referred to the economic costs that indoor air pollution imposes on this nation. This letter responds to your request for additional information on this issue.

In February of 1987, the U.S. Environmental Protection Agency (EPA) published a report entitled, Unfinished Business: A Comparative Assessment of Environmental Problems. This report, requested by EPA Administrator Lee M. Thomas, examined the relative risks to human health and the environment posed by environmental problems. The report ranked problem areas based on the population cancer risk.

Indoor radon exposure ranked highest (tied with worker exposure to chemicals) of any single environmental problem -- with current estimates of 5000 to 20,000 lung cancers annually from exposure. Indoor air pollutants (exclusive of radon) ranked fourth with an estimated 3500 to 6500 lung cancers annually. The report also found relatively high non-cancer health risks associated with indoor pollutants, with large populations exposed above the level of concern and with effects ranging from moderate to severe (from jaundice to teratogenicity and mortality).

Although CFA does not subscribe to the current practice of assigning value to life for cost-benefit analyses, even the conservative figures used by an Office of Management and Budget economist suggest the magnitude of societal costs of indoor air pollution. (See "A Review of the Record," John F. Morrall, III, Regulation, November/December 1986, p.34.) The mean estimate used for the economic cost of a life is $3.3 million, with a median estimate of $1.7 million. Using the mean estimate of $3.3

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million, the annual cost from indoor air pollutants (inclusive of radon) ranges from $28.05 billion (8500 lung cancers) to as high as $87.45 billion (26,500 lung cancer deaths). Even using the low side figure of $1.7 million, the range is $14.45 billion to $45.05 billion. These figures do not even include the additional health effects associated with indoor air pollutants. The $58 million dollar annual cost of solving the problem as proposed by this measure pales in comparison to what society is now spending to deal with the problem, even at the low side annual estimate of $14.45 billion.

CFA is currently undertaking a more extensive review of the costs of indoor air pollution, which we will certainly provide to you as soon as possible.

Sincerely,

Stephen Brobeck
Executive Director

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2702F-2400

STATEMENT OF PHIL MERRILL
ON BEHALF OF THE NORTHERN NEW ENGLAND INDOOR AIR POLLUTION COALITION

Mr. Chairman, Members of the Senate Subcommittee on Environmental Protection I want to thank you on behalf of myself and the members of the Northern New England Indoor Air Pollution Coalition for the chance to present our views on S. 1629.

Our coalition consosts of the Service Employees International Union, The New Hampshire State Employees Association, and the Maine State Employees Association. We joined together because indoor air was making our members sick and tradition methods of confronting this problem at the workplace had proved to be inadequate. After coming together and showing our common experiences, we quickly determined that several factors were responsible for our failure to successfully readdress these problems.

One, there is inadequate knowledge about the problem among health professionals. Two, there is a vacuum of information on the part of decision makers. Three, there are no standards against which to measure offending conditions. Four, there is an understandable but unacceptable desire on the part of public officials to turn a blind eye to these problem, in hope that by doing so the challenges it poses can be ignored.

Mr. Chairman this bill addresses in a meaningful way everyone of those concerns. It does so in a way that does not over commit the Federal government or ignore the role of other public decision makers. There are several modest changes that we would like to offer. We believe these changes will improve the legislation without making its passage more difficult, or offending its present construct.

First we believe that in Section 2, Findings you should hold that indoor air pollution not only poses serious threats to public health, but also reduces productivity at the workplace. Our surveys of state employees in Maine and New Hampshire demonstrate clearly that employees who work in "sick buildings" admit to reduced productivity. Some might argue that lost productivity is far less a harm then a serious threat to public health, but we have observed that it is often a better stimulus for change.

Second, in Findings again, specific reference should be made, when listing indoor air pollution, of bacteria and fungi which often spawn inside improperly maintained air ventilation systems.

A person working in a modern tight building is dependent upon that mechanical air system and it s duct work for the air he breathes, just as you would be dependent on a air tube if your found yourself underwater for an extended period of time. Before putting that tube to your mouth, you might ask how clean it was; what was in it? This is too often over look in air delivery systems. Caribou, Maine we have a member who has had most of one lung removed as a result of a fungi growth on his lung. A fungi of the same kind as we found growing in the air ducts of that Northern Maine building where he worked.

Third, in Section 3, PURPOSE, as with the national AIDS epidemic, while research is vitally important, however so is the role of education. Where the facts regarding the causes and control of indoor air pollution are already known, education should be a priority. A much heavier emphasis on the education of building owners, managers, and occupants is suggested.

Fourth, under DEFINITION 5, we suggest you change your definition of "Federal building" to include, along with all buildings in which the government has fee ownership, those buildings in which the federal government has a long term leasehold.

Fifth, under Section 5, RESEARCH, we believe that studies should include efforts to quantify the costs to employers from indoor air pollution. Costs that would be found in lost productivity, sick time use, increased use of employer paid health insurance and workers compensation claims. For, as we have stated, we believe that as we come to appreciate these costs at the workplace, efforts to solve the problems will be more forthcoming.

Sixth, also under Section 5, we believe demonstration projects should include efforts to discover and develop successful means to educate the public about these problems. Model education programs that provide examples of balance and cooperation will do much to help other decision makers realize that these human problems are manageable.

And seventh, under Section 5 again, we would ask that you define non-profit institution and organizations to specifically include, along with health and education organization, employee advocate organization such as our own. We have first hand experience, and staff that include health professionals. We believe we can contribute. The present wording of the bill does not probably prevent that but clear language would, we believe, better assure that result.

Eighth, under Section 7, National Response Plan, there is a critical need to provide concise yet comprehensive educational materials for all affected parties. One of EPA's first responses to the asbestos in buildings threat was to publish a comprehensive guidance document Guidance for Controlling Asbestos - Containing Materials in Buildings. In addition to the Health Advisories, we believe the legislation should require the EPA to prepare a similar guidance document for identifying, characterizing, evaluating and controlling indoor air pollution problems.

Ninth, under Section, also under Response Plan, we believe building occupants and other affected parties should be able to request building surveys by EPA or a designated authority when indoor air pollution problems are suspected. These surveys would prove beneficial to EPA in further studying the factors that cause indoor air problems - and in identifying solutions. This right to request a survey by EPA should also be conferred to all building occupants - and not limited to federal sector workplaces.

Tenth, we believe a 800 number information line would prove to be a most useful resource to many of us as we struggle to deal with these problems I would urge you to make such a requirement part of the EPA response to this problem.

Finally, Mr. Chairman, we believe the sponsors of this bill are to be congratulated on developing legislation which recognizes the responsibility of federal leadership without ignoring the limitations on such involvement. Limitations that spring not only from fiscal constraints that we know are much on your minds and the minds of your colleagues, but also limitations that spring from the traditional limited role of the national government in matters concerning real property and buildings. In sum, we believe this is a well crafted bill and deserves the support of this subcommittee and the United States Congress.

Northern New England Indoor Air Pollution Coalition

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SUMMARY OF COMMENTS ON S. 1629

The Northern New England Indoor Air Pollution Coalition supports S. 1679, The Indoor Air Quality Act. We believe this proposed legislation goes a long way to address the serious problems caused by indoor air pollution.

However, we would strongly suggest the following improvements to the bill:

Section 2 (a) FINDINGS (1)

In this section, we believe the bill should mention, in addition to health effects, the cost in reduced worker productivity and lost workdays caused by indoor air pollution. Health problems caused by ventilation systems contaminated with bacteria and fungi must also be recognized. Employees for instance, have filed workers compensation claims because of these types of indoor air quality problems.

Section 3 (a) PURPOSE (1)

As with the national AIDS epidemic, research is vitally important, however so is the role of education. Where the facts regarding the causes and control of indoor air pollution are already known, education should be a priority. A much heavier emphasis on the education of building owners, managers, and occupants is needed.

Section 4 (a) DEFINITIONS (1)(u)

Approximately half of all buildings used by the federal government are leased. The term "Federal Building" should therefore include all federally owned or leased buildings.

Section 5 (c) TECHNOLOGY DEMONSTRATION PROGRAM (INDOOR AIR QUALITY RESEARCH)

It should be acknowledged that educational efforts are a "demonstrated practice, method, technique, or process." Improving the quality, quantity and dissemination of education regarding the current state of knowledge is a "technology" that is an effective means of controlling indoor air pollution. Therefore demonstration grants should be targeted toward the design and implementation of effective education efforts.

Also, examples of nonprofit institutions should be more clearly identified to include employer trade associations, labor organizations, and universities.

Finally, studies should be conducted to quantify the cost to the employer from indoor air pollution. Costs that would be found in lost productivity, use of sick leave, and increased health insurance and workers compensation claims.

Section 7 (c) SUPPORTING ACTIONS (NATIONAL INDOOR AIR QUALITY RESPONSE PLAN)

One of EPA's first responses to the asbestos in buildings threat was to publish a comprehensive guidance document Guidance for Controlling Asbestos - Containing Materials in Buildings. We believe the EPA should prepare a similar guidance document for identifying, characterizing, evaluating and controlling indoor air pollution problems.

Section 7 (e) FEDERAL BUILDING RESPONSE PLAN (NATIONAL INDOOR AIR QUALITY RESPONSE PLAN)

Building occupants and other affected parties should be able to request building surveys by EPA or a designated authority when indoor air pollution problems are suspected. These surveys would prove beneficial to EPA in further studying the factors that cause indoor air problems - and in identifying solutions. An onsite inspection should be required within 30 days upon such a request, with a preliminary report due within 60 days, and a final report in 180 days.

Also, employees that request such inspection must be protected from discrimination.

Finally, we believe the above rights to survey by EPA must be also conferred to all building occupants - and not limited to federal sector workplaces. Obviously, this is a significant amendment to this bill - but extremely important and vital if we are serious in beginning to address the problems posed by indoor air pollution.

Section 12 (a) AUTHORITY (NATIONAL INDOOR AIR QUALITY INFORMATION CLEARINGHOUSE)

A requirement that EPA establish an 800 toll-free phone number for the "Clearinghouse" is needed. While seemingly a relatively insignificant point, from a practical standpoint this action would have a dramatic effect in increasing public use and access of this important resource.

TESTIMONY
of
James E. Woods, Jr.

Presented before the
Subcommittee on Environmental Protection
of the
Committee on Environment and Public Works
United States Senate

November 20, 1987

My name is James E. Woods, Jr., and I reside at 1235 Yale Place, #805, Minneapolis, Minnesota. I am a Senior Engineering Manager with Honeywell, Building Controls Division, Golden Valley, Minnesota. I am a member of the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE), the American Society of Testing and Materials (ASTM), and the Building Research Board of the National Research Council. I am a Registered Professional Engineer. I was chairman of the committee that developed the ASHRAE Standard 62-1981: "Ventilation for Acceptable Indoor Air Quality", and have recently completed the appointment as chairman of the Indoor Air Quality Committee of the Building Research Board, which has published a report entitled "Policies and Procedures for Control of Indoor Air Quality". My testimony is based on research and practice I have been involved in personally for the last 25 years in the field of heating, ventilating, and air conditioning.

The objectives of my testimony, today, are threefold:

1) To share some recent experiences with you on diagnoses of "sick buildings";

2) To comment on Senate Bill S. 1629, introduced by Senators Mitchell, Chafee, Durenberger, Baucus, Mikulski, Stafford, and Lautenberg on August 7, 1987; and

3) To present some additional recommendations and conclusions for consideration by this Committee.

Diagnoses of "Sick Buildings"

For the past two years, I have been responsible for the technical direction of a new service offered by Honeywell, which we call Indoor Air Quality Diagnostics. Since this service was first offered for public access (i.e., commercial/institutional) buildings in the spring of 1986, we have received more than 300 inquiries, and have investigated approximately 30 of the most complex cases. These cases have typically been previously investigated by others with conventional industrial hygiene procedures which have not been able to resolve the occupant complaints. Because the procedures we employ are systems oriented, they are more comprehensive and the cost is usually greater. Thus, the population of buildings we have investigated is probably biased toward those situations where serious concern for the health and welfare of the occupants has been demonstrated by the building owners or managers.

We have recently analyzed the results from some of these cases, and they provide a glimpse of the nature of problem buildings:

1. Sixty-five percent of these investigations were in response to symptoms associated with "Sick Building Syndrome" (SBS); 35% in response to symptoms associated with a combination of Sick Building Syndrome and "Building Related Illness" (BRI); none were in response to BRI alone. The differences in these problems are described in references 1 - 3 (Reference 1 may be obtained from the National Research Council; References 2 and 3 are included as Appendices A and B).

2. Thermal problems were identified in 55% of these cases; humidity problems in 30% of the cases; chemical contaminants in 75%; and microbiological contaminants in 45%. Of the chemical contaminants, odors were detected in 70% of the cases; particulate concentrations above 50 ug/m3 in 5%; and other chemicals 5%.

3. Physical causes of the complaints in these cases can be characterized as operational factors and design factors. Operational factors included: lack of sufficient maintenance in 75% of the cases; changes in thermal and contaminant loads since the time of initial occupancy in 60% of the cases; and implementation of energy management strategies without evaluation of environmental impact in 90% of the cases. Design inadequacies were found in all cases. These included both system problems and equipment problems. System problems were identified as: inadequate outdoor air (75%); inadequate supply air distribution (65%); and inadequate return/exhaust air (70%). Variable air volume systems were involved in 25% of the cases; heat pump systems (10%); fan coil systems (10%); and induction systems (5%). Equipment problems included: contaminated internal duct lining (45%); contaminated humidifiers (20%); inoperable or inadequate drain pans and drain lines (60%); inadequate access panels to equipment (60%); and inadequate filtration (65%).

In a more representative (i.e., less biased) population, we have also conducted a national telephone survey to assess the role that air quality plays in contributing to a productive office environment (Refs. 4, 5). Results from this stratified random sample of 600 adult office workers in nine demographic ares of the U.S. indicated that a significant percentage of respondents (24%) were dissatisfied with the air quality in the office. Moreover, 20% perceived their performance to be hampered by the air quality. The physical factors most frequently cited as "serious" or very serious" concerns by that 20% included: lack of air movement (67%); being too hot in summer (61%); stagnant or still air (55%); cigarette smoke (54%); being too cold in winter (53%); and being too humid in summer (50%). The human responses most frequently cited as "serious" or "very serious" concerns by those who perceived difficulty doing office work because of the air quality included: a tired/sleepy feeling (56%); a congested nose (45%); eye irritations (41%); difficulty in breathing (40%); and headaches (39%). Because these responses are similar to the types and frequencies of symptoms associatdd with SBS, we have proposed the following hypothesis (Ref. 5):

> It is possible that 20% of the office workers in the U.S. are exposed to environmental conditions that are manifested as SBS.

Our data indicate that improvements in the design and operation of the indoor environmental control (i.e., HVAC) systems will reduce the percentage of those who perceive that the air quality hampers their performance. These improvements should not only increase occupant performance, but should also improve the performance of the systems and reduce costs of operation (e.g., improve energy utilization). Thus, if occupant performance can be increased by methods that reduce costs of operations, a significant increase in productivity should result. For example:

> What would be the impact on our Gross National Product if, by means of improvements in system performance, the percentage of those who perceive that the air quality hampers their performance is reduced from 20 to 10%?

These results have led us to propose a general definition of indoor air quality (Refs. 2, 3, 5) :

> "Indoor air quality is the nature of air that affects your health and well-being".

This definition incorporates the World Health Organization's concept of health (Ref. 6):

> "Health is a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity".

Analyses of the cases we have investigated and results of our survey seem to indicate that air quality control cannot be readily separated from thermal control of occupied spaces. These findings support the technical definition of indoor air quality that was proposed in research for the State of Iowa in 1982 (Ref. 7):

> Indoor air quality is an indicator of how well the air satisfies the following conditions:
>
> o Thermal conditions of the air must be adequate to provide thermal acceptability for the occupants as defined by ASHRAE Standard 55-1981.
>
> o The concentrations of oxygen and carbon dioxide must be within acceptable ranges to allow normal functioning of the respiratory system.
>
> o The concentrations of gases, vapors, and aerosols should be below levels that can have deleterious effects, or that can be perceived as objectionable by the occupants.

It is, therefore, reasonable to conclude that indoor air quality is a natural extension of thermal control, and should be based on the principles of psychrometrics.

Comments on S. 1629: Indoor Air Quality Act of 1987

In previous testimony on Indoor Air Quality Research before the U.S. House of Representatives Committee on Science and Technology, August 2, 1983, I recommended seven needs regarding energy conservation and acceptable indoor air quality that should be addressed by both governmental and private organizations:

1. The characterization of new and existing building stock with respect to their energy consumption and indoor air quality.
2. Methods of assessment of new and existing building stock with respect to indoor environmental problems.
3. Education of professionals and the general public regarding safe and comfortable ways of achieving energy conservation.
4. Methods of predicting the quality of the indoor environment and the amount of energy required to provide that quality.
5. Methods of measuring contaminants that may be at concentrations below those that can now be measured.
6. Development of new methods of control.
7. Development of new product and system performance standards.

It is gratifying to find that S. 1629 addresses most of these needs in a comprehensive and focused manner. The focus of this Act on demonstration projects at both the Federal and State levels (Sections 5(c), 8, and 11) is especially important, as it will provide a practical base for the required research and the education and training aspects of the program.

There are, however, three major issues that have been neglected in the Bill:

1. Perceived responses of the occupants, including odor annoyance and thermal discomfort.
2. Energy management of the facilities.
3. Economic factors relating to the owning and operating cost of the building, and the labor and other investment costs of the tenants and other occupants of the facilities.

In the recent BRB report which was commissioned by the Federal Construction Council (Ref. 1), four recommendations for action by administrators and policy-makers were presented. These recommendations should also be addressed in the Bill:

1. Testing and quantification should be performed to determine the effect of reduced air quality on productivity.

2. Energy management strategies that could lead to reduction in indoor air quality should be weighed against the potential reduction in productivity that could result.

3. Because of the mismatch between the complexity of current building systems and the ability of managers and operators to understand, adjust, and monitor system operation, training and education should be developed and encouraged to produce effective accountability for the proper management of building systems.

4. Federal and local government agencies should build into their capital budgets the funds required to correct indoor air quality problems and to provide adequate operations and maintenance for acceptable environmental quality.

Perceived Responses. The Bill recognizes that contaminants can exist indoors at concentrations that "pose serious threats to public health including cancer, respiratory illness, skin and eye irritiation, and related effects" (Sec. 2). However, it does not seem to distinguish between contaminants and their concentrations that can be perceived by the occupants from those that cannot. In this regard, the Bill implicitly accepts the clinical definition of health as opposed to that defined by WHO. It is important to conduct mortality and morbidity studies as outlined in Sec. 5(a)(1)(E), but it is equally important to gain a thorough understanding of the effects that indoor air contaminants can have on the well-being of the occupants.

In the BRB report, three categories of complaints about poor air quality were identified:

- Perceptible physiological stressors such as odorous contaminants and heat,

- Nonperceptible physiological stressors such as airborne biological contaminants (e.g., fungi, bacteria, pollen, and their metabolites). Others in this category include radon, asbestos, carbon monoxide, metals, and several volatile organic compounds.

- Perceptible nonphysiological stressors such as job related stress.

In this classification, the first category can be characterized by contaminants that stimulate the four basic types of sensory receptors (i.e., thermoreceptors, olfactory receptors, auditory receptors, and visual receptors). These stressors are usually recognizable and changes in their values are usually sensed by occupants. If "acceptable" limits are exceeded, complaints of discomfort will usually result. Contaminants in this category are most closely associated with SBS. Mitigation of complaints can often be accomplished by improvements to system performance even though the etiology of the complaints remains unknown. Contaminants in this category, their concentrations, and methods of controlling them seem to have been neglected in this Bill.

Stressors that do not affect the sensory receptors or that only affect them at values above those that cause physiological strains are included in the second category. Contaminants in this category are most closely associated with BRI. Mitigation of exposure to these contaminants usually requires an understanding of their etiologies and the application of source control; system modifications are not usually sufficient (e.g., legionella or radon mitigation). Because these contaminants can be present in occupied spaces without perception, they are of particular concern and seem to be the focus within this Bill, especially in Sec. 6. The number of these contaminants extends well into the thousands. For example, environmental tobacco smoke is composed of more than 3800 compounds (Ref. 8). Therefore, "to publish advisory material addressing the human health effects of individual contaminants", as stated in Sec. 6(b)(1), may not only be impractical, but impossible.

Stressors in the third category influence occupant responses to the other two categories. Physical stressors may be perceived by occupants to have greater strains if excessive psycho-social stressors also exist. Thus, shifts can occur in contaminant concentrations that might cause complaints or have deleterious effects. Situations in this category are usually associated with SBS, and mitigation may require both system modifications and occupant counseling. The Bill does not address individual susceptibilities and, therefore has a major oversight in addressing indoor air quality control in the various classifications of buildings and functions conducted within them.

Many systems are designed and operated to achieve "acceptable" responses of occupants to perceivable stressors within indoor environments. When this is done, many of the nonperceived stressors are coincidently mitigated by these methods. Thus, a fundamental question that should be addressed in this Bill is:

> What will be the residual exposures if perceived physiological stressors are controlled within acceptable limits?

Energy Management. Although energy conservation strategies in buildings has often been cited as a cause for poor indoor air quality, this issue has not been addressed in the Bill. Reduced energy consumption continues to be a significant driver in the design and operation of buildings. Many of the strategies result in degradation of indoor air quality, but in some cases, energy management strategies can improve indoor air quality (e.g., improved ventilation efficiency, air quality feedback control, optimization control) (see Ref. 3).

Specifically, the effect of energy management on indoor air quality should be addressed in the following Sections of the Bill: 5(b), 5(c), 7(c), 7(e), 8(a), 8(b), 8(c), and 11(b).

Economic Factors. The Bill does not recognize the economic impact (either positive or negative) that might result from modifications to system performance. Without economic constraints, it is technically possible, today, to provide nearly any degree of cleanliness that might be desired in occupied spaces. Thus, from an economic viewpoint, indoor air quality control may be considered in terms of risk management. In today's economy, buildings are often designed and managed to minimize first costs and owning and operating costs, respectively. This strategy usually results in providing indoor environmental conditions that do not cause excessive discomfort or complaints. For example, the ASHRAE Standards 55-1981 (Thermal Environmental Conditions for Human Occupancy) and 62-1981 (Ventilation for Acceptable Indoor Air Quality) specify conditions which are expected to be acceptabe by 80% of the occupants. Seldom are the costs associated with lost time due to illness or discomfort factored into the management strategies for the facilities.

To indicate the potential conflicts between energy management, indoor air quality, and overall economic effectiveness, we have considered a typical office space occupied by a middle manager and a secretary (see Ref. 3). In one case of this example, we assumed that a 25% annual energy savings was realized by strategies that affected environmental quality. We calculated that, if this savings resulted in one day per year that the manager lost due to illness or if two minutes per day were lost in concentration, the energy savings would be counter-productive. Conversely, if environmental quality can be provided by energy efficient strategies, productivity will be increased (i.e., increased value in performance divided by reduced cost of operation).

Specifically, the effects of indoor air quality on productivity should be addressed in the following Sections of the Bill: 5(b), 5(c), 7(c), 7(e), 8(a), 8(b), 8(c), and 11(b).

Protocols. Objectives and procedures required to sample, analyze, and interpret the performance of occupied spaces in terms of human responses are fundamentally different for indoor air quality diagnosis than for industrial facilities. Conventional industrial hygiene instrumentation and methods are often insufficient for assessment of residential and public access buildings. New protocols are being investigated by ASTM, ASHRAE, and the American Conference of Governmental Industrial Hygienists (ACGIH). We have recently developed and presented one such protocol at a recent ASTM Symposium on this topic (Ref. 9). Fundamentally, the differences in these protocols pertain to a known or limited number of sources and contaminants in industrial facilities as compared to a large number of sources and contaminants in most residential and public access facilities. Exposures in industrial facilities are often compared with standards such as Threshold Limit Values, Time-weighted averages, and Permissible Exposure Levels, all of which are established to minimize the absence of measurable health effects in industrial facilities. In residential and public access buildings, acceptable concentrations may be log orders of magnitude below the industrial values and are often associated with Odor Recognition Thresholds. Source control is a common solution in industrial facilities, whereas, system solutions are often required in residential and public access facilities.

Special consideration to the required differences in protocols should be addressed in the following Sections of the Bill: 5(a), 5(b), 6(b), 7(c), 7(d), 7(e), 8(a), 8(b), 9(a), and 11(b).

Performance Standards. Prescriptive standards, such as required amounts or rates of ventilation air, are helpful in the design of buildings and their systems, but they are difficult to evaluate in occupied facilities. Conversely, performance standards, such as acceptable contaminant concentrations, are useful in assessing systems in operation but difficult to use as a design tool. Therefore, it is desirable to have criteria that can be used in design and operation. By use of modeling techniques and experimental verification, rationalization of prescriptive and performance standards is feasible. We have reported on one such effort to rationalize the two procedures in ASHRAE Standard 62-1981 (Ref. 10). Much additional work is needed in this effort and should be addressed in the following Sections of the Bill: 5(a), 5(b), 5(c), 7(c), 7(e), 8(a), 8(b), 8(c), 9(b), and 11(b).

Additional Recommendations for Consideration by the Committee

Indoor air quality should be controlled in three stages of a building's life:

- o Design — pre-construction
- o Commissioning -- pre-occupancy
- o Occupancy — useful life of the building

Recommendations for Design. Building codes should be updated and modernized to reflect current technology for IAQ control. Most criteria pertaining to mechanical systems in current codes are prescriptive. A significant amount of resistance to changes in these codes is based on concern for litigation. As a result, innovative designs are stifled.

Building codes are also needed to address renovation of existing facilities. These projects often require consideration of the present conditions and those that will exist during renovation, as well as those that should exist after completion of the project.

To increase the likelihood that acceptable environmental conditions can be maintained during the useful life of the building, efforts should be directed toward designing for the last day of occupancy of the building, rather than the first day of occupancy. This concept may increase the first cost of some buildings, but should reduce the life-cycle costs and lead to increased productivity within the facility.

Support should be given to the private sector to promote the use of standards that reflect more than minimum requirements. Performance criteria should be developed by the consensus processes used by ASHRAE, ASTM, and other technical societies within the private sector.

Recommendations for Commissioning. Methods for ascertaining "occupancy worthiness" of a building should be developed. Basically, this would occur before the building in occupied, and evaluate compliance of the building with design performance criteria. Also needed are procedures for establishing baseline performance data for the newly occupied building. ASHRAE and ASTM are both developing voluntary standards for this purpose.

Studies and demonstrations in government owned buildings should be incorporated into Sections 5, 8, and 11 of this Bill to establish baseline performance data and cost-effectiveness of the commissioning process.

Recommendations for Occupancy. Minimum qualifications and accountabilities should be developed for personnel responsible for maintaining acceptable environmental quality in buildings. Also needed are procedures that these personnel can use to assess the environmental quality in the buildings. These needs were partially addressed by recommendation #3 in the BRB report. Educational and training programs should be supported in this Bill to develop a population of "Qualified Operators" of building environmental control systems. The objective of this program would be to increase the probability that acceptable indoor air quality would be maintained in the building during its lifetime.

Architects, engineers, and other design professionals should accept responsibility for performance of the building for a definite period (e.g., 10 years after design), for fee. For this procedure to work, however, building owners and managers would have to be responsible for notifying the design professionals when changes were contemplated for the facility. Environmental impact studies could then be undertaken before the changes are implemented. These procedures should minimize the degradation in environmental quality that has been seen in buildings due to excessive changes in thermal or contaminant loads, or due to inappropriate energy management strategies. Demonstration of this concept could be included in Sections 8 and 11 of this Bill.

Conclusion

The comments presented, here, are meant to be constructive and supportive of the Bill. In general, I wish to congratulate the sponsors of this Bill, and I endorse it as an excellent beginning to dealing with a potential major problem in a comprehensive and focused manner. If it is implemented, I am encouraged that not only will indoor air quality problems eventually be minimized, but occupant health, comfort, and performance will be enhanced, energy efficiently and cost effectively.

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TESTIMONY OF THE NATIONAL COUNCIL FOR CLEAN INDOOR AIR ON SENATE BILL S. 1629, "THE INDOOR AIR QUALITY ACT OF 1987"

Presented by John Bond, Executive Director

U.S. SENATE SUBCOMMITTEE ON ENVIRONMENTAL PROTECTION

November 20, 1987

On behalf of the National Council for Clean Indoor Air, I thank you for the opportunity to discuss several aspects of this important public health concern.

First and foremost, I congratulate you Senator Mitchell, your committee and your staff for addressing this issue with meaningful legislation. Your interest and involvement has been a crucial factor in bringing increased attention and activity to this issue. In these times when agencies are faced with budget constraints and bulging statutory mandates, legislative authority is necessary in order to get the various departments and agencies to commit resources commensurate with the magnitude of the health threat posed by poor indoor air quality.

Our Council was formed with the mission of fostering a greater understanding of indoor air quality concerns among public policy officials, the public at large, and private decision makers; and to assist in the formation of programs and policies to reduce the risks of indoor air pollution. In undertaking that mission, we emphasize a close coordination of science and policy, and the active involvement of private and public actors in the policy decision making process.

One of the fascinating aspects of the indoor air quality issue is the challenge of being presented an issue without an existing policy framework. In short, we have a clean slate and in building a new program, we must address the fundamentals as well as the technical issues.

In reading the findings of this bill and the popular brochures describing the issue of indoor air quality, one typically finds a rundown of air pollutants. The problem with that definition is it does not include a considerable portion of the issue. Indoor air quality is not a traditional kind of pollution problem, and it is not amenable to a traditional kind of pollution regulation program. The indoor air issue is a complex, but comprehendible, combination of designing, constructing, maintaining, occupying, and polluting an indoor environ. We need to examine all the aspects of the issue, and not just the pollutants and their sources. If we do not fully define the issue, we are virtually certain not to fully solve the problem. The findings of this bill should include these other "buildings" and "behavior" factors.

A second problem definition aspect which needs to be addressed is the definition of what is not a problem. We need to differentiate between indoor air quality the issue, and indoor air quality the problem. the good news is that not everything to do with indoor air is a problem. The bad news is we really do not know enough to state with certainty, what those non-problems are. We need to do so, however, in order that valuable resources may be concentrated where they will produce the most to improve the public health.

Adopting the broader definition of the issue to include buildings, occupants and pollutants, there are additional actions to be included in the bill which would expand and strengthen an indoor air quality program.

An exception to this general comment is the section authorizing a research program. This section does already recognize all causes and sources of indoor contamination and does not focus strictly on pollutants. The authority is also flexible enough to provide for interagency coordination and coordination among different programs in those instances where research dollars may be strecthed by a study being applicable to two or more statutory programs.

Just as the problem definition is an interaction of several factors, there is a consensus growing that the problem resolution will also involve the interaction of several actors. Any list of the major private and governmental actors would have to include the federal government, state and local governments, several types of private businesses, and building owners and occupants.

At a minimum, the federal government has four crucial roles: One, to conduct basic research; two, to provide carrots and sticks to ensure that other actors perform the appropriate tasks; three, to regulate products when necessary to protect the public health; and, four, to act as a model landlord by developing building design, construction, operation and maintenance procedures, by using its purchasing power to stimulate a market in non-toxic or low toxic furnishings, equipment and buildings-related products, and by developing procedures for management/occupant cooperation in the operation and use of a building.

Basic research is always an appropriate federal function and good scientific knowledge is absolutely vital to an effective response program. In addition to the classic health based risk assessment studies, the congress, EPA and other research agencies must make a policy decision regarding what types of monitoring, testing, diagnosis and remediation equipment will be the focus of applied research efforts.

One of the questions posed in the invitation to testify was whether the authorization levels provided in section 14 were appropriate given the health effects of indoor air contaminants and the funding of related programs. That is the easy question and the easy answer is yes. The hard question is whether we develop legislation using the assumption that it will get all the money it deserves. A suggestion is to develop a program and an office in EPA that has the clout to seek appropriations commensurate with the risk being posed to the public health, but assumes in the immediate future that budgetary resources will be limited. This assumption will require some prioritizing of the programs embodied in this bill.

For several reasons, not the least of which is budgetary, the one aspect of this bill which I must outright oppose is the bureaucratic nightmare and paper blizzard which it contemplates. You finally have an EPA which is ready and willing to do something about the issue, and what you are telling them to do is to write reports and serve coffee and donuts to the rest of the federal government. If they are finally going to do something, have them improve the public health. I strongly urge you to revise the bill to provide a structure which is demanding in the arena of public health, but not so demanding in its bureaucratic burdens.

The one bureaucratic/management decision which I do believe to be proper to convey in legislation is the demand that the Office of Indoor Air Quality be made an operational office and not a developmental office, and that it be done so as soon as possible. We do not want a program in development, we want a program in operation, and the program should be accorded that status within the agency.

These are just a few of the comments expressed by our Board regarding this bill. Others here today are scheduled to express many of the same accolades and concerns which our members have stated, and rather than being repititious, let me just extend our offere to continue working with the committee and its staff as we all help this important legislation move through the process.

STATEMENT OF

THE AMERICAN SOCIETY OF HEATING, REFRIGERATING AND
AIR CONDITIONING ENGINEERS, INC.

BEFORE THE

COMMITTEE ON ENVIRONMENT & PUBLIC WORKS
SUBCOMMITTEE ON ENVIRONMENTAL PROTECTION

U.S. SENATE

HEARING ON INDOOR AIR QUALITY

NOVEMBER 20, 1987

Mr. Chairman,

Thank you for the opportunity to be here today to comment on your proposed legislation on indoor air quality. I am speaking on behalf of the American Society of Heating, Refrigerating and Air-Conditioning Engineers, which is commonly known by its acronym ASHRAE and is a technical society of some 53,000 individual members. Our membership is composed of consulting engineers, contractors, design professionals, and employees of academic and research institutions, manufacturers, and government.

ASHRAE's business is simply occupant comfort in buildings, all the technical knowledge associated with providing that comfort, and the effects of that technology on the environment. Indoor air quality is a major focus of Society activity and its Standard 62, "Ventilation for Acceptable Indoor Air Quality," is the only voluntary consensus standard available in the U.S. today to regulate the quality of the air indoors. I will provide more detail about ASHRAE and its related technical materials in my complete written statement, but now I would like to direct my comments to the legislation under consideration by the committee.

Senate Bill 1629 is a comprehensive bill directed at the broad indoor air quality problem. ASHRAE certainly supports such an effort. Let me emphasize two features of the bill and then add a few additional indoor air quality concerns for your consideration.

1. A major thrust of the bill is research. Government must take a leading role in research, particularly in the area of health effects and in the area of contaminant measurements. The private sector will not be able to accomplish all of the research needed in these two areas, but the private sector is able to disseminate and apply the results of such research.

   ASHRAE, for example, has a research program which is supported by the private sector. A portion of its research dollars is directed at indoor air quality problems, but ASHRAE focuses more on buildings and building systems than on medical aspects.

2. It is important that information on health effects and recommended exposure levels be disseminated to the user community. The health advisories provision, Section 6 of the bill, will be an important vehicle in this regard. By using the term advisories, we interpret this, in most situations, to mean "guidelines" rather than regulations, which then could be put into the private sector to establish control levels by promoting good design practices or, when appropriate, by developing private-sector consensus standards. Sections 7c and d supports this activity.

Now, I would like to address two additional aspects of the poor indoor air quality problem which you may wish to address in the proposed legislation. To make these points, I need to draw upon ASHRAE's experience in developing good design practices in the area of ventilation in buildings. The provisions of ASHRAE Standard 62-1981 are provided in the written comments, but our experience points out two important aspects which should be considered.

1. Occupant health is not the only consideration when evaluating possible indoor air quality contaminants. ASHRAE's Standard 62 incorporates health information and control levels when available, but generally the standard is considered to be what is termed a "comfort-based" standard; that is, a standard that covers contaminants and conditions in buildings which may not be a health risk but may affect indoor air quality. A combination of low-level concentrations of certain substances may not pose a health risk but may affect indoor air quality, resulting in annoyance and the perception of "sick building syndrome."

It is now generally accepted that discomfort in the work place significantly affects worker productivity and absenteeism. Studies have shown that buildings which do not have adequate temperature and humidity control may give the perception of "stuffy air" even when the air itself is relatively clean. Often, the problem has been associated with poor operation and maintenance practice. Buildings must be maintained and operated as designed to perform to desired levels.

2. ASHRAE is concerned not only with the quality of the indoor environment, but also in providing good indoor air quality in a cost-effective and energy-conserving manner. These are two very important considerations in achieving good indoor environments, and these two considerations may comprise many of the technological developments which will be needed. If cost is no consideration, any problem can be solved. If there always will be ample energy, then there is only economic need to conserve energy. ASHRAE's Standard 90 "Energy Conservation in New Building Design" is a resource document for energy codes and standards in all 50 states. ASHRAE is very concerned about the nation's future energy situation and urges energy conservation in all buildings.

Mr. Chairman, I refer you to the more detailed written statement, and I applaud your efforts on indoor air quality. A proposed expenditure each year of approximately $58 million would total about one dollar per person in the United States for the entire five-year period: Twenty cents a year for clean and healthful indoor air. In summary, ASHRAE would encourage the committee to consider more than just health effects in classifying contaminants and ask that the committee consider cost effectiveness and energy conservation when developing solutions to poor indoor air quality problems.

Thank you.

Testimony of
American Society of Heating, Refrigerating
and Air-Conditioning Engineers, Inc.

November 20, 1987

Written Statement Supplement

3253C

American Society of Heating, Refrigerating
and Air-Conditioning Engineers, Inc.

Written Statement Supplement

ASHRAE Research and Technical Activities

ASHRAE is a technical society and as such has a comprehensive program of research, standards writing, and technical activities. ASHRAE has approximately one hundred technical committees and task groups comprised of about 2000 ASHRAE members and industry-related professionals who volunteer their time and technical expertise to develop and update the Society's technical base of knowledge. The Society, in cooperation with its network of local chapters, raises funds from the private sector to conduct research to support the development and advancement of technology. Most of the research is conducted at academic institutions.

ASHRAE Environmental Health Committee

In 1984, ASHRAE recognized that many of the environmental questions related to buildings were beyond the technical expertise of most of ASHRAE's membership. ASHRAE then established a special Environmental Health Committee, whose membership represents the medical, engineering, and industry-related disciplines needed to provide the necessary input. The Committee has developed a position paper on indoor air quality which is attached to this statement.

ASHRAE Standards Activities

ASHRAE develops voluntary consensus standards used by the industry. Most of the standards are directed to the procedures for testing and measuring, but the Society has a few standards which have public policy dimensions. ASHRAE Standard 90, "Energy Conservation in New Building Design," serves as the resource document for energy codes and standards in all 50 states. ASHRAE 100 series standards focus on energy conservation in existing buildings.

ASHRAE Standard 62

In the area of indoor air quality, ASHRAE Standard 62-1981, "Ventilation for Acceptable Indoor Air Quality," is the only definitive standard covering this issue available in the United States today.

In 1973 ASHRAE published its first ventilation standard, which was updated in 1981. As a result of ASHRAE's policy of reviewing each standard every five years, Standard 62-1981 is in the final stages of being updated with the revised standard expected to be approved and published in 1988.

The current standard is included with this written statement. However, the provisions will be summarized briefly. The quantity of outside ventilation air is specified in tables for each conditioned space in a building depending on the type and use of the space. The ventilation air quantity is specified in terms of air volume per occupant, cfm per person. The estimated occupancy of typical spaces is provided in the standard. Ventilation rates are specified for occupied spaces where smoking is permitted and spaces where there is no smoking. The minimum value appearing in the tables for certain non-smoking areas is five cfm per person.

The need to conserve energy is recognized in the standard by including provisions for increasing the amount of recirculated air with the application of appropriate air cleaning technology. The use of heat recovery systems, such as air-to-air heat exchangers, is discussed along with other provisions such as permitting the intake of outside air in the building to be adjusted to the number of people in the building.

The standard provides an alternate method which may be exercised by the designer. The Indoor Air Quality Procedure provides the designer with a listing of contaminants and permissible levels of contaminants, where information is available.

The proposed revision of Standard 62 increases the minimum ventilation rate from five to fifteen cfm per person. This is because the proposed draft no longer makes the distinction between smoking and non-smoking spaces. This determination is based on the need to replenish the air and remove carbon dioxide concentration buildup produced by human occupants. Increasing the minimum ventilation rate could significantly affect energy costs if heat recovery methods are not employed. The proposed standard adjusts some of the contaminant levels appearing in the 1981 standard: formaldehyde from 0.1 ppm to 0.4 ppm and radon from 0.01 working level to 0.027 working level, which corresponds to the current EPA action level.

Other ASHRAE Standards

Although Standard 62 is the principal standard, ASHRAE has several standards related to the indoor air quality issue. Standard 55, "Thermal Environmental Conditions for Human Occupancy," specifies the combination of factors necessary for thermal comfort within a building environment. Important environmental parameters are temperature, thermal radiation, humidity, and air movement. Important occupant parameters are type of clothing and level of activity. Standard 62 requires that ventilating systems be designed and installed so that they do not cause conditions which conflict with Standard 55.

Two standards presently in the process of development, which will be available in the future, include Standard 129P, "Standard Method of Test of Ventilation Effectiveness," just underway, and a new standard to establish a method of measuring ventilation rates in detached buildings (such as single family dwellings) where air infiltration (through cracks and around windows and doors, for example) is a contributing factor.

The purpose of the new Standard 129P is to provide a repeatable and accurate method of evaluating an air distribution system's ability to provide the required levels of ventilation air to the occupants of the building.

ASHRAE Indoor Air Quality Position Paper

ASHRAE's new position paper on indoor air quality reviews health issues, research needs, and identifies the various programs that ASHRAE will undertake to assist its membership and others concerned with indoor air problems. Described in the paper are health effects and control measures for groupings of pollutants and for the phenomenon known as "sick building syndrome." The pollutants covered include combustion products, volatile organic compounds, airborne allergens and pathogens, formaldehyde, radon, and asbestos.

In the position paper approved by the Society's Board of Directors, ASHRAE asserts:

1. Acceptable air Quality is necessary for all indoor environments.
2. Indoor air quality should be maintained at levels expected to protect occupants from adverse health effects and discomfort.
3. No single private sector group has the comprehensive interest, resources, and competence in indoor air quality technology to insure that a well-funded, systematic research development program is conducted.
4. The private sector will respond to the need for improved indoor air quality with improved innovative and cost-effective solutions when their desirability and efficacy have been established through non-proprietary research.

Therefore, ASHRAE recommends:

1. ASHRAE Standard 62, a comprehensive ventilation standard which recognizes the balance between conserving energy and providing for human health and comfort, should be widely disseminated and referenced by state and local building codes.

2. Support by federal governments for research in all non-proprietary areas of indoor air quality (health effects, measurement methods, modeling, and control technology) should be substantially and selectively increased. This research should address the dangers of indoor air pollution to populations identified at risk. It should evaluate the total pollutant exposure to individuals and the contributions of indoor sources to this exposure. Of particular importance are radon, asbestos fibers, unvented combustion appliances, formaldehyde, tobacco smoke, and volatile organic compounds. Cost effective and efficient means of reducing health risks must be identified in this research.

3. The private sector should be involved in improving performance standards and for enhancing its members' educational and professional practices.

4. Governments should examine the existing policy options and develop others as needed to encourage reduction of indoor air pollution.

5. Governments should assist in communication of technical information through joint sponsorship of research, publications, and conferences.

6. Local governments, assisted by federal governments, should provide educational, technical, legal, or financial assistance for the remedial actions required.

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Indoor Air Quality
Position Paper

Approved by the ASHRAE Board of Directors August 11, 1987

I. Roster

1986–87 Environmental Health Committee

The ASHRAE Position Paper on Indoor Air Quality was developed by the Society's Environmental Health Committee.

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Indoor Air Quality Position Paper * Subcommittee

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II. Abstract

This paper outlines ASHRAE's past, current, and future interests in and responsibilities for Indoor Air Quality (IAQ). It covers the reasons for increased indoor air quality concerns and summarizes problems involving the effects of indoor air quality on short and long-term occupant health and comfort. Several pollutants are examined for their perceived and real effects in indoor environments.

Research needs are addressed, for both ASHRAE's attention and for others who should support the research effort. Needed standards are similarly recognized. Also, current information on ASHRAE's research and standards activities are presented for necessary background.

Finally, recommendations are set forth for actions by ASHRAE and others that are deemed necessary for the continued improvement and maintenance of acceptable indoor air quality while minimizing deleterious effects on health, safety, natural resources, and the outside environment.

III. Purpose and Scope of the Position Paper

This position paper defines ASHRAE's responsibility with respect to indoor air quality, discusses past contributions, and expresses the consensus within the Society on the importance of maintaining and improving indoor air quality in an energy-efficient manner. Also, the paper makes recommendations for a coordinated research program to identify and solve problems and to implement solutions through appropriate professional practices, standards, and guidelines.

Scope: This paper applies to all indoor environments that people may occupy except those which are exclusively industrial since industrial environments are subject to separate regulations. Environments of concern in this paper include residences, offices, mercantile establishments, government buildings, schools, universities, places of assembly, transportation facilities and vehicles.

Environmental parameters not directly related to indoor air quality, such as acoustical, illumination, and vibrational factors are not included in this paper.

IV. ASHRAE Interest in Indoor Air Quality

ASHRAE is concerned with the technical means for conditioning of the indoor environment and with the specification and creation of conditions that provide a comfortable and healthful air quality for the occupants of indoor environments. ASHRAE is also concerned that the design and maintenance of systems that provide comfortable and healthful indoor environments be consistent with the goal of optimizing energy use in buildings.

Most of the research and regulatory activity having to do with the quality of the air has been concentrated on the outdoor environment and the industrial work place. In the last two decades substantial progress has been made in the improvement of the outdoor ambient air quality. This has made the outdoor air available for ventilation considerably cleaner.

During the same period, buildings have been made tighter, ventilation rates have been reduced, and many new contaminants have been detected or introduced into the indoor environment. These factors tend to increase the concentration of airborne contaminants indoors which is where most people spend up to 90 percent of each day. The total personal exposure to contaminants is largely determined by the quality of the air in the various indoor environments to which the person is exposed.

ASHRAE and its predecessor societies have over 90 years of professional history in solving indoor air quality problems. Ventilation has been a primary concern throughout this period; indeed, one of the predecessor societies included "ventilating" in its title. In 1973 ASHRAE revised and issued as its own the only ventilation standard developed by consensus by non-government agencies. ASHRAE Standard 62 is the basis for almost all of the ventilation requirements contained in North American building codes. ASHRAE has sponsored research on indoor air quality in the past as well as provided presentations and publication of research results on indoor air quality.

Beginning in the early 1970's energy problems constituted a large part of ASHRAE's interest. In the United States, ventilation has traditionally been the primary solution to controlling indoor air quality and because the energy required for heating, cooling, transporting and otherwise processing ventilation air for buildings in the United States approaches 10 percent of the total energy consumption, there has been considerable attention devoted to reducing ventilation.

In many cases ventilation has been reduced to the point of causing indoor air quality complaints since the concentration of any internally generated pollutants increases with reduced ventilation (ventilation defined for this purpose is the amount of outdoor air supplied to interior spaces). Therefore, reduced ventilation is one cause of recent increased concern about indoor air quality. Other factors are also implicated. New construction techniques and new materials, machines, and consumer products have been introduced, some of which outgas more pollutants. Increased use of unvented combustion appliances, mostly in residences, and occupant actions intended to save energy have also added to the problem. In addition, more has been learned about health effects of indoor air pollutants and new instrumentation has made it possible to detect, identify and measure pollutants at levels not previously possible. All these factors have increased attention on indoor air quality.

Indoor air quality problems which affect people fall into three general areas: (1) comfort, (2) acute health effects, and (3) chronic health effects. Comfort has long been an ASHRAE concern. Stuffy, odorous environments may not be unhealthy, but they reduce the sense of well-being and may affect performance. Acute health effects, such as burning eyes, chest symptoms, and transmission of airborne disease are also important. Chronic or delayed health effects are probably the most difficult to establish, often taking decades to appear. ASHRAE is concerned with all three of these as they relate to indoor air quality, and must provide designs and operating strategies suitable for the various types and uses of buildings. At the same time, energy conservation will remain important. ASHRAE believes that acceptable indoor air quality can be maintained in energy-efficient buildings.

The provision and maintenance of healthful and acceptable indoor air quality is a responsibility which is widely shared, and can only be accomplished with the active cooperation of all concerned. It is the responsibility of designers and installers to ensure that building systems are effective in reliably providing and maintaining the desired indoor air quality. To do this, the design professions must know what contaminant sources may be present and in what strength. They must also provide the owners, operators, and occupants with the most effective operating and maintenance procedures. Owners, operators, and occupants have a responsibility not to introduce new or stronger contaminant sources than can be accommodated in the original design, to maintain the mechanical systems, and not to modify the building without having appropriate adjustments made to the mechanical systems.

While the shared responsibility complicates the attainment and maintenance of desirable indoor air quality, there is a further complication in that these responsibilities are sequential. The design professions exercise their responsibility during design and construction, while the owners, operators, and occupants bear their responsibility throughout the life of the building.

Whenever problems with indoor air quality arise, the ventilation system is the first system faulted for the condition; it is equally often the system that is relied upon for a solution. Although indoor air quality may be impaired by inadequate ventilation, HVAC systems seldom are the direct cause of these problems with a few exceptions such as contamination by bioaerosols or duct fibers.

Because of the diversity and heterogeneity of indoor spaces, and because of the shared responsibility for indoor air quality and the relatively recent increase in awareness of indoor air quality problems, knowledge of the distribution and concentration of contaminants is incomplete and poorly organized. Knowledge of adverse health effects on the occupants is even less adequate. Often, dissatisfaction with indoor air quality is due to acute discomfort and irritation rather than observed illness. Such association of indoor air contaminants with illness is unlikely to be observed without very carefully designed studies. In addition, few such studies have been carried out with simultaneous adequate characterization of exposures, illness, and other factors.

ASHRAE is committed to contributing to the development and implementation of building design and control techniques to optimize indoor air quality and energy conservation. Design techniques include the optimization of air distribution systems to provide outside air effectively within the conditioned zones of a building. Indoor air quality control techniques include both pollutant-specific strategies (e.g., source mitigation and product substitution) and non-pollutant-specific techniques (e.g., heat recovery, ventilation and air cleaning). When ventilation rates are reduced below recommended values, indoor air quality will suffer unless specific pollutant control techniques are implemented.

V. Indoor Air Quality Environmental Health Issues

A. Indoor Combustion

Definition and Background

Several types of combustion processes contribute to indoor air pollution. These include but are not limited to the use of gas ranges, unvented gas or kerosene heaters, woodburning stoves or fireplaces, and tobacco smoking. The major products of combustion are carbon dioxide and water vapor, but other contaminants are also introduced into the environment. Of the numerous by-products of combustion, contributors to indoor air contamination are carbon monoxide, the oxides of nitrogen, and respirable suspended particles (RSP). The relative amount of each of these contaminants depends upon the fuel burned and the conditions of burning. In addition, other chemicals, including volatile organic compounds, may be released.

Indoor combustion sources tend to be intermittent and generally confined to certain areas of the structure. As a result, levels of combustion byproducts in indoor air are quite variable with use patterns, and between rooms within a structure. They may also vary with outdoor conditions. This variability must be taken into account when monitoring indoor air for combustion byproducts.

Health Effects

Carbon monoxide (CO). Carbon monoxide is an odorless gas that is associated with incomplete combustion processes. In addition to indoor combustion, sources of carbon monoxide include all types of fossil fuel powered equipment. Carbon monoxide combines with hemoglobin to form carboxyhemoglobin, resulting in a decrease in the oxygen carrying capacity of the blood. This results in complaints of fatigue, shortness of breath, headache, nausea, and, at high levels, death. Individuals with pre-existing cardiovascular disease are most susceptible to carbon monoxide toxicity. The relationship between carboxyhemoglobin concentration and adverse health effects is reasonably well established. There is general agreement that carboxyhemoglobin levels above 4-5 percent can exacerbate the symptoms of people with cardiovascular disease. The current National Ambient Air Quality Standard (NAAQS) for carbon monoxide is 9 parts per million (ppm) maximum for eight-hour average exposure, or 35 ppm maximum for one-hour average exposure. These levels are intended to provide an adequate margin of safety for carboxyhemoglobin levels in individuals with cardiovascular disease.

Nitrogen oxides. The nitrogen oxide of major health concern is nitrogen dioxide (NO_2). In high concentrations, it is associated with effects on the respiratory passages. Acute exposure to nitrogen dioxide in the range of 1-5 ppm results in increased respiratory passage resistance. In experimental studies in animals, acute exposures to NO_2 above 1 ppm concentration produce increased susceptibility to respiratory infections. In humans some epidemiologic studies have reported an increase in acute respiratory illness in children associated with NO_2 levels below 1 ppm.

Respirable Suspended Particles (RSP). Particulate matter is produced, in varying degrees, by all combustion processes. Respirable suspended particles (RSP) are generally defined as particles less than ten microns in diameter. There is considerable variability among RSP both with respect to size and chemical composition. Particulate matter is known to be a respiratory irritant, especially in asthmatics. Although a National Ambient Air Quality Standard (NAAQS) exists for outdoor levels of total suspended particulate matter (TSP), this standard cannot be readily applied to indoor RSP, which differs both in size distribution and chemical composition from outdoor particulate matter.

The contribution of individual combustion sources to levels of carbon monoxide, nitrogen oxides, and respirable suspended particles has been the subject of much research. Each of these contaminants may arise from multiple sources, and the determination of the contribution of any single source requires a carefully controlled experimental design. Levels will depend not only on the source emission rate but also on the volume of air that is distributed, on the ventilation rates, and on interaction with other components of the environment.

Health Effects of Complex Combustion Sources

Unvented combustion appliances. A number of epidemiologic studies have examined the effects of exposure to the combined pollutants produced by unvented combustion appliances. Some of these studies found a weak association between respiratory illness in children and exposure, while others failed to demonstrate such an association. A quantitative relationship between combustion appliance exposure and respiratory illness has not been established. Case reports have shown that malfunctioning combustion appliances can produce elevated levels of CO and NO_2.

Environmental tobacco smoke (ETS). ETS has been recognized as an important component of indoor air pollution. ETS contains a complex mixture of chemicals, respirable particles, and various combustion gases, all raising questions of toxic effect. The presence, concentration, and effects of these agents have been the object of a number and variety of studies over the years. Many of these have shown a positive correlation between specific health outcomes and ETS exposure. Acute effects of ETS include eye and throat irritation, headache, rhinitis, and coughing. Some sensitive persons report wheezing, sneezing, and nausea. Annoyance, odor, and sensory irritation are well documented. The relationship between ETS concentration and discomfort and acceptance by study panels has been well established. Respiratory infections and decrements in pulmonary function in children of smoking parents are also well established. Studies linking ETS to lung cancer were recently reviewed in a National Academy of Sciences/National Research Council Committee report and in a report by the Surgeon General that concluded that there is a consensus that lung cancer rates are probably elevated by ETS. The combined effects of ETS and other pollutants and the effects of temperature and relative humidity require further study.

Other sources. Several studies have identified combustion products in building air that originated from automobiles, trucks, and buses being operated in garages and loading areas in or adjacent to buildings.

Controls

Outdoor air intakes for buildings should be located so that intake of exhaust from motor vehicles is minimized. The use of unvented space heaters fueled by gas or kerosene is prohibited by many local codes and should be avoided. An increasing number of measures have been used to reduce the concentration and the impact of tobacco smoke on nonsmoking occupants. An increasing number of building owners and operators have eliminated smoking in buildings, or in parts of buildings. With partial smoking bans the re-circulated air can still distribute a dilute concentration of tobacco smoke throughout the building.

The usual way to reduce the impact of combustion products is to increase the ventilation rate. Buildings in which smoking is permitted generally require higher ventilation rates than buildings in which smoking is prohibited. Particulate air cleaners may be very efficient in removing the smoke particles but cannot remove the gaseous components most responsible for tobacco odor.

B. Volatile Organic Compounds (VOC)

Definition and Background

The term volatile organic compounds refers collectively to a large number of organic vapors which contaminate indoor air. Over 300 VOC have been identified in indoor air at concentrations exceeding 1 part per billion (ppb). Among the most commonly reported VOC are ethylbenzene, benzene, o-, m-, and p-xylenes, styrene, chlorinated solvents, including 1,1,1-trichloroethane, tetrachloroethylene, and trichloroethylene, carbon tetrachloride, m,p-dichlorobenzene, methylene chloride and chloroform. VOC are consistently found in higher concentrations indoors than outdoors. Within a structure their concentrations are variable with time and location, suggesting the presence of significant indoor sources.

The sources of VOC are numerous and include building materials, consumer products, cleaning solvents, paints, adhesives, cosmetics, hot water, and indoor combustion sources. Relatively little information exists on the contribution of individual sources to indoor levels of VOC.

Health Effects

Acute exposure to high levels of many VOC is associated with irritation of the eyes and upper respiratory tract. Concern over chronic health effects of VOC derives from occupational and animal toxicity studies. Some individual VOC known to be present in very low concentrations in indoor air have been implicated as carcinogens. However, no direct data exist to link indoor exposure to VOC with chronic health problems. The chronic and acute health effects of VOC in complex mixtures over a range of concentrations encountered in buildings are not well understood and should be investigated.

Controls

Control of VOC contamination of indoor air is accomplished through a combination of identification and removal of sources and increased ventilation. During and following new construction, renovation or refurbishing of a building there often are temporary elevations of concentrations of VOC indoors. A variety of strategies may be used to reduce occupant exposures during such a period. Such strategies include limiting construction to weekends, temporarily increasing ventilation rates, or heating of an unoccupied building to 120 degrees Fahrenheit for a short period to drive off gasses.

C. Airborne Allergens and Pathogens

Definition and Background

The term "bioaerosol" is used to describe, collectively, airborne particulate matter of microbiological origin, especially that from viruses, bacteria, fungi and their spores, and protozoans. Bioaerosols are ubiquitous in indoor air and generally do not lead to infection. They may, however, be associated with reactions in populations of susceptible individuals. In rare instances, contamination of indoor air with highly infectious agents has been associated with significant outbreaks of disease.

Health Effects

The health effects of bioaerosols can be divided into two categories according to their mechanism: infectious and immunologic. Airborne transmission is a recognized method for the spread of infectious diseases of viral, bacterial, and fungal origin; however, microbial contamination of indoor air is usually not an environmental health concern. Only a small percentage of the population, primarily those with a compromised immune system, will generally be at risk of infection from normal microbial contamination of indoor air. When a component of the indoor space provides a substrate or a ventilation system component becomes a reservoir or amplification site, and thus a source of microbial contamination to the space, all occupants are at risk. For example, overt fungal contamination resulting in elevated level of spores in indoor air has been reported to occur following interior flooding, as damp carpeting or furnishings serve as a good substrate for fungal amplification. Humidifiers, flush toilets, and ice machines may also become a source of bioaerosols. Areas of the HVAC system, particularly areas where water can accumulate, may also provide a substrate for microbial growth and dissemination. Legionnaires' disease is a prototypical example of the role of HVAC systems in the contamination of indoor air by bacterial sources. Legionella pneumophila, the causative agent for this disease, is found in water supplies and in soils. It is amplified in some cooling towers and in some cases buildings with air intakes downwind from such cooling towers have had their HVAC systems function as a transmitter of this infectious organism to occupants.

Some bioaerosols have also been associated with immunologically mediated reactions. The symptoms occur primarily in the respiratory tract and include allergic rhinitis, asthma, humidifier fever and hypersensitivity pneumonitis. Skin reactions may also occur. These reactions are mediated by an immunologic mechanism and occur more frequently in sensitive individuals among the building occupants. Although allergic reactions require prior sensitization, some, such as humidifier fever and acute hypersensitivity pneumonitis occur through poorly characterized mechanisms that do not require prior sensitization.

There are virtually no data on which to base a determination of safe levels of specific bioaerosols for either the general population or a susceptible sub-population. However, the number of case histories of bioaerosol-related building illness reported in the literature is increasing rapidly.

Controls

There are several approaches to the control of bioaerosol-related health effects. The primary approach is source removal. For example, when microbial contamination can be traced to a particular portion of the HVAC system or specific furnishings, source removal can be easily accomplished. Similarly, the bioaerosol source resulting in allergic symptomatology may be identified. An example is microbial contamination of humidifiers. Such contamination can be readily cleaned or removed. Since outdoor air may be an important source of microbial contamination, filtration of intake air is another approach to the control of bioaerosols.

The design and maintenance of the HVAC system is extremely important in the control of bioaerosols. The location of air intake vents with respect to both outdoor sources and HVAC related sources, such as cooling towers and discharge stacks, is important. Since microbial amplification is promoted in areas with high moisture content, the control of relative humidity at a level generally no higher than 60 or 70 percent as measured in the occupied space is recommended. Furthermore, areas of standing water within the HVAC system should be eliminated or reduced. If sprayed water systems are used, a maintenance program to control bacterial growth must be a part of the operation. The prophylactic use of disinfectants in the HVAC system, excluding cooling towers, is unacceptable in most instances.

D. Formaldehyde

Definition and Background

Formaldehyde is an irritating gas that is usually found in much greater concentration indoors than outdoors. Concentrations higher than 100 ppb are measured in many indoor environments. The major indoor sources of formaldehyde are pressed wood products, insulation, combustion, textiles, furnishings, and consumer products. Factors that effect the emission rates of formaldehyde from these products include quality of the resin bonds, the installation of the source, its age, the temperature of its surface, and the temperature and relative humidity of the indoor environment.

Health Effects

Low level exposures to formaldehyde as encountered in indoor air result in eye, nose, and throat irritation, while long-term exposures have been associated with health problems including headaches, dizziness, nausea, coughing, recurring infections of the upper respiratory tract, and menstrual irregularities. Formaldehyde is also a sensitizer, at least dermally. While it is clear that animal exposure to high concentrations of formaldehyde leads to cancer, the current consensus is that formaldehyde may not be a potent carcinogen for humans.

Controls

Aging or baking of formaldehyde-emitting products reduces the emission rate. Technology is available to produce pressed wood products that do not present a formaldehyde problem. Resins have been improved to decrease their formaldehyde contributions to indoor air. Urea formaldehyde bonded products are being improved to reduce formaldehyde emissions and should be properly installed and used.

E. Radon

Definition and Background

Radon is a naturally occurring, chemically inert, odorless, tasteless radioactive gas. It is produced from the radioactive decay of radium, which is formed, through several intermediate steps, from the decay of uranium. Since radium and uranium are ubiquitous elements in rock and soil, radon is also. Because radon is not chemically bound or attached to other materials, it can move easily through very small spaces such as those between particles of soil and rock. Radon-222, produced by the decay of radium-226, is the type of radon of most concern in indoor environments.

A major source of indoor radon in residences is radium in the soil and rock under the building. Secondary sources include groundwater and radium-containing building materials. Radon gas can enter a residence through cracks or openings such as sewer pipe and sump pump openings, cracks in concrete, wall-floor joints, hollow concrete block walls. The amount of radon entering a residence is dependent on several factors, including the concentration of radium in the surrounding soil or rock and the soil porosity and permeability, and lower air pressure in the residence which may be caused by stack effect or operation of exhaust fans.

Radon has a half-life of approximately four days, decaying into progeny and emitting alpha particles in the process. The four sequential decay products of radon gas are chemically active particles that have half-lives under 30 minutes. Alpha particles in the lung transfer their energy into nearby cells and kill or damage the irradiated cells.

Health Effects

The inhalation of the decay products of radon is likely to be one of the most significant sources of risk to human health from indoor air pollution, and has been estimated to contribute thousands of lung cancer cases per year in the United States.

Long-term exposure to the short-lived radon decay products is associated with an increase in the risk of lung cancer. The decay products of radon tend to adhere to dust particles or other surfaces and, if inhaled, can also adhere to the airways of the lung. Radon gas, on the other hand, is almost chemically inert and an inhaled radon atom is very likely to be exhaled before it decays. Thus, the main risk from radon is lung cancer associated with inhalation of its short-lived decay products, or progeny.

Estimates of the risk of lung cancer due to radon exposure are based on studies of workers in underground mines who were exposed to radon progeny. These workers developed lung cancer at a higher rate than that observed in the general population. Although the epidemiological evidence is not directly applicable to people who do not work in mines, it is an adequate basis for concern about indoor radon exposure.

Many factors affect the radon concentration in a residence. These include building type, local geology and climate, and occupant activities. Differences in these factors can cause the annual average indoor radon concentrations to be as much as 100 times greater in one residence than in another. These variations make it difficult to predict which localities or which buildings will have elevated indoor radon concentrations. Some of the more important factors affecting radon concentrations are:

- Soil characteristics—The potential for indoor radon increases with increasing permeability and radium content of the soil. Clays and water-laden soils, for example, are likely to retard the flow of radon.

- Construction type—The type of structure and its design affect the amount of area in contact with the soil, the air exchange rate in the residence, and the number and size of entry points for radon. For example, residences with well-ventilated crawl spaces are likely to have less radon than other residences on the same site with tightly enclosed crawl spaces.

- Foundation condition—Cracks and openings in the foundation walls and floor can serve as entry points for radon.

- Occupant lifestyle and weather—Both of these can affect the ventilation rate for a residence and, hence, the degree to which radon or any other indoor pollutant is trapped inside.

When measuring indoor radon, it is important to recognize that indoor concentrations can vary hourly, daily, and seasonally. For example, measurements made during a mild spring may underestimate the annual average level because of ventilation from open windows. Similarly, indoor levels during a cold winter may be higher than average because the residence is sealed. Thus, longer term measurements (six months to one year) made in residences during normal use generally provide more reliable estimates of the radon concentration. Shorter term measurements made under controlled conditions by trained personnel can also provide reliable information. Two techniques in wide use for homeowner measurements are the charcoal canister (short term) and the track-etch (longer term) methods.

Controls

Two approaches to reducing exposure to indoor radon are (1) to prevent radon entry into a residence and (2) to remove radon or radon decay products after entry into a residence. The first approach is the more desirable, especially if accomplished in a manner that does not require maintenance or checks. The most effective measures include:

- Sealing cracks and openings such as basement drains and utility openings in the foundation with caulking or epoxy sealants.
- Exhausting from crawlspaces or underfloor areas, including sumps or other drain systems.
- Sealing tops of hollow concrete block foundations with concrete.
- Covering exposed earth inside or under the residence with concrete or a tightly sealed polymeric vapor barrier.
- Increasing the ventilation rate. The use of air-to-air heat exchangers will reduce the heating or air conditioning load.

F. Asbestos

Definition and Background

Asbestos is composed of a group of calcium-magnesium silicates which are fibrous in nature. Asbestos has the properties of being both a good insulator and a fireproofing material. As a result, it has been used in a large number of building materials and consumer products. Release of asbestos into the air depends upon the cohesiveness of the asbestos containing material and the disruptive force which is applied to it. Spray application of asbestos onto structural surfaces, now prohibited, presents the greatest potential for contamination of indoor air. Sprayed material is usually more susceptible to disruptive force.

Health Effects

Inhalation of asbestos has been shown to result in lung disease including fibrosis and scarring of the lower lobes of the lungs, lung cancer, and mesothelioma. These effects have been confirmed in populations occupationally exposed to asbestos. Similar effects have been reported in individuals living with an asbestos worker or living in the vicinity of an asbestos producing plant. To date, non-occupational sources of asbestos exposure have not been compellingly associated with health disturbances.

Controls

Control strategies for dealing with asbestos contamination of indoor air must be developed case-by-case. Source removal may not always be the best solution because the act of removal may introduce significant levels of asbestos into the air. Alternatives to source removal include encapsulation, enclosure, or preventive management in asbestos-containing areas. Such controls must be accomplished with methods approved by Occupational Safety and Health Administration (OSHA) or Environmental Protection Agency (EPA).

G. Carbon Dioxide as an Indicator of Ventilation

Definition and Background

Carbon dioxide (CO_2) is an odorless, colorless gas that is formed whenever carbon-containing substances are burned. Its sources in indoor air include combustion from unvented appliances and normal metabolic activity of building occupants. Measurement of carbon dioxide levels may be a reasonable surrogate for direct measurement of ventilation of a building. In the absence of indoor combustion the metabolic production of CO_2 by occupants in sedentary activity with a ventilation rate of 15 cfm per occupant will produce a steady state concentration of about 1000 ppm of CO_2.

Health Effects

Acute exposure to high levels of carbon dioxide is associated with complaints of hyperventilation, headache, dizziness, shortness of breath, and drowsiness. The threshold limit value for such complaints was set at 5000 ppm carbon dioxide, although individuals will tolerate higher levels without harmful effects.

Controls

In the absence of significant combustion sources, the concentration of carbon dioxide in indoor air depends on the occupancy rate and is inversely related to the supply of outside air.

Therefore, indoor levels of carbon dioxide are readily controlled by increasing ventilation.

H. Sick Building Syndrome

Definition and Background

The term "sick building" is used to describe a building in which a significant number (more than 20 percent) of building occupants report illness perceived as being building-related. This phenomenon, also known as "sick building syndrome," is characterized by a range of symptoms including, but not limited to, eye, nose, and throat irritation, dryness of mucous membranes and skin, nose bleeds, skin rash, mental fatigue, headache, cough, hoarseness, wheezing, nausea, and dizziness. Within a given building, there will usually be some commonality among the symptoms manifested as well as temporal association between occupancy in the building and appearance of symptoms. Over the past several years higher energy costs have resulted in the introduction of new building materials, decreased ventilation and decreased air leakage. These trends have contributed to the "sick building syndrome," where specific chemical causes are seldom found.

Health Effects

Identification of the etiology of episodes of "sick building syndrome" requires a systematic approach which considers not only levels of indoor air contaminants but also other factors including temperature, relative humidity, noise, radiant heat, lighting, vibration, and ventilation. In general, the cause of "sick building syndrome" is identified on the basis of successful remedial action.

The "sick building syndrome" complaints reported by occupants are nonspecific in nature and provide little information which is useful in identifying the source of their problems. A similar spectrum of complaints is associated with almost all indoor air contaminants including carbon monoxide, nitrogen oxides, volatile organic compounds, formaldehyde, and carbon dioxide.

Controls

Studies of a large series of buildings with complaints of building related illnesses by National Institutes of Occupational Safety and Health (NIOSH), as well as by independent companies specializing in indoor air quality problems, suggest that the most common cause of sick buildings is inadequate supply of outdoor air or inadequate air distribution, resulting in build-up of carbon dioxide and other indoor contaminants. Therefore, the design and function of the HVAC system should be a primary focus when investigating the cause of building-related illness.

In some cases, a specific source of indoor air contamination can be identified as the cause of "sick building syndrome". Most commonly this source is identified as emissions from building materials, furnishings, or occupant-related activities. When a discrete source is identified, the building can be "cured" by removal of the source. In a substantial percentage of buildings, no specific cause of the problem can be identified, other than an inadequate supply of outdoor air, which is often not specifically measured.

VI. Research Needs

ASHRAE and its predecessor societies have investigated problems of indoor air quality for many years. The vast bulk of this work, however, was in the area of thermal aspects of indoor air quality considering such factors as air temperature, radiant temperature, moisture content, and air motion with specific reference to the subjective comfort sensations of humans in the occupied space.

The effects of many contaminants in the industrial workplace have been well established by groups such as the American Conference of Governmental Industrial Hygienists (ACGIH). The ACGIH has recommended Threshold Limit Values (TLV) as guidelines for exposure to a number of substances recognized as harmful to humans, and in the United States, the Occupational Safety and Health Administration (OSHA) has set workplace standards in this area. Although the ACGIH threshold limit values are much higher than the usual indoor levels, the exposures in non-industrial indoor settings may be chronic, 20-hour or more per day, seven-day per week, 52-week per year. ASHRAE is concerned for the general population including infants, the frail elderly and the sick in addition to healthy adults. Much of the available data base, at best is of limited use. In addition to needing information on the adverse health effects of chronic, life-long exposure to low levels of recognized pollutants that may appear in the indoor air, information is also needed on the relative responses of susceptible populations to short term levels of dusts, biological agents, chemicals found in everyday household products or released from building materials, and other pollutants.

Many technical committees (TCs) within ASHRAE have expertise in this area. They include TC 2.3 and 2.4 for gaseous and particulate filtration, TC 3.6 and 8.6 for treatment of cooling towers or evaporative condensers, TC 1.7 for operating and maintenance procedures of HVAC&R systems, TC 5.7 for evaporative cooling and TC 8.7 for humidifiers. These and other committees whose scopes include items of HVAC&R equipment which can serve as reservoirs, amplifiers, and/or disseminators/distributors of microbiological air pollutants to the occupied space should all be aware of indoor air quality concerns.

Liaison between the various TCs and other groups within ASHRAE should be facilitated through the Society's Environmental Health Committee, which will also be responsible for liaison to external groups involved with indoor air quality such as the U. S. Department of Energy (DOE), American Conference of Governmental Industrial Hygienists (ACGIH), American Industrial Hygiene Association (AIHA), Occupational Safety and Health Administration (OSHA), National Institutes of Occupational Safety and Health (NIOSH), Consumer Product Safety Commission (CPSC), Air Pollution Control Association (APCA), Environmental Protection Agency (EPA), and others.

VII. ASHRAE Standards Affecting IAQ

ASHRAE's Standard 62 *Ventilation for Acceptable Indoor Air Quality* is the standard most directly addressing indoor air quality. Other ASHRAE standards make reference to it. Standard 55 *Thermal Environmental Conditions for Human Occupancy*, addresses indoor air quality—but only from the thermal (rather than contaminant) standpoint.

Indirectly, ASHRAE's energy conservation standards 90 (for new building design) and the 100-series (for existing buildings) affect indoor air quality. Standard 52, *Method of Testing Air-Cleaning Devices Used in General Ventilation for Removing Particulate Matter*, addresses devices that may be used to improve air quality through air filtration.

VIII. ASHRAE Technical Activities in Indoor Air Quality

An understanding of the scope of ASHRAE's technical activities and their interrelationships aids in understanding ASHRAE's interest and direction in indoor air quality. ASHRAE's key activities are research, standards development, organizing technical programs, and publishing a comprehensive set of technical handbooks and numerous other publications (monthly Journal, transactions of technical meetings, research notes, position statements, and other special publications). Technical expertise is the common thread running through all of ASHRAE's activities.

ASHRAE's technical activities are concentrated in its 90 technical committees, each specializing in a particular area of interest. The membership of these committees is the primary source of ASHRAE's technical expertise. These committees conduct technical programs such as seminars and symposia and they solicit technical input from the membership at large through technical forums. They initiate research by writing work statements—and then monitor the resulting research as it progresses. Most technical committees are responsible for one or more Handbook chapters, which they periodically revise. Technical committees prepare or review articles to appear in the *ASHRAE Journal*. They often participate in the preparation of other special publications as well.

The need for standards on a given subject is usually identified by technical committees. Standards are prepared by carefully constituted standards project committees whose members are volunteers selected on the basis of expertise and balance between producers, users, and interest groups. ASHRAE membership is not a requirement for participation on technical committees or standards project committees.

ASHRAE's activity in the areas of indoor air quality has been growing as the public's interest in the subject has increased. It is common for up to half a dozen programs at the Annual and Winter ASHRAE Meetings to be devoted to some aspect of indoor air quality. Such programs, when presented in a symposium format, become part of the transactions published by ASHRAE. A forum held in 1987 solicited input on what ASHRAE should be doing in researching indoor air quality in large buildings.

In 1984, a Presidential Ad Hoc Committee on Environmental Health Issues was established to evaluate potential environmental health risks of concern to ASHRAE. One of its main recommendations was the creation of a standing committee within ASHRAE specifically directed to environmental health issues. Such a committee has been established and meets regularly, reporting directly to the Technology Council, an arm of ASHRAE's Board of Directors. The membership of the committee includes engineers and health scientists, both ASHRAE members and non-members.

IX. ASHRAE Cooperation with Others

ASHRAE has active cooperative activities with many groups outside ASHRAE. Several such activities of importance to Indoor Air Quality problems are listed below.

1. Building Code Groups—State and local building codes have used many ASHRAE standards. The National Conference of States on Building Codes and Standards (NCSBCS) works closely with ASHRAE.

2. ASHRAE cosponsors several conferences each year, one specifically on the subject of Indoor Air Quality, which broadens the information transfer.

3. ASHRAE's Government Affairs Committee facilitates advising federal and local governments on relevant technical issues.

4. In addition to cosponsoring conferences, ASHRAE maintains liaison with many other professional and technical societies with similar technical concerns.

5. ASHRAE maintains active contacts with nearly 30 international groups with similar interests. In this way, exchange of technology between the U.S. and other countries is encouraged.

6. ASHRAE's over 50,000 worldwide members with their simultaneous membership in other organizations make it possible to learn of important developments outside ASHRAE.

X. ASHRAE Conclusions and Recommendations

ASHRAE Asserts:

1. Acceptable air quality (air in which there are no known contaminants at harmful or annoying concentrations) is necessary for all indoor environments.

2. Indoor air quality should be maintained at levels expected to protect occupants from adverse health effects and discomfort. (It may not be always practical to assure the complete removal of a given contaminant).

3. Indoor air quality in buildings often does not meet the levels desired by the occupants.

4. No single private sector group (professional society, manufacturing association, trade association or branch of industry) has the comprehensive interest, resources and competence in indoor air quality technology to insure that a well-funded, systematic research and development program is conducted.

5. The private sector will respond to the need for improved indoor air quality with improved innovative and cost-effective solutions, when their desirability and efficacy have been established through non-proprietary research.

6. There are a number of acute air quality problems that require immediate remedial actions employing available technology.

ASHRAE Recommends:

1. ASHRAE Standard 62, a comprehensive ventilation standard which recognizes the balance between conserving energy and providing for human health and comfort, should be widely disseminated and referenced by state and local building codes.

2. Support by federal governments for research in all non-proprietary areas of indoor air quality (health effects, measurement methods, modeling, and control technology) should be substantially and selectively increased. This research should address the dangers of indoor air pollution to populations identified at risk. It should evaluate the total pollutant exposure to individuals and the contributions of indoor sources to this exposure. Of particular importance are radon, asbestos fibers, unvented combustion appliances, formaldehyde, tobacco smoke, and volatile organic compounds. Cost effective and efficient means of reducing health risks must be identified in this research.

3. The private sector should be involved in improving performance standards and for enhancing its members' educational and professional practices.

4. Governments should examine the existing policy options and develop others as needed to encourage reduction of indoor air pollution.

5. Governments should assist in communication of technical information through joint sponsorship of research, publications, and conferences.

6. Local governments, assisted by federal governments, should provide educational, technical, legal or financial assistance for the remedial actions required.

ASHRAE will not:

Be a principal participant in basic health science research on effects of air pollutants, although results of this research should be used by ASHRAE. Also, determination of criteria and technologies related to process control and of the resulting contaminant levels is excluded.

ASHRAE will:

1. Increase its programs of research and standards development for ventilation requirements and product testing.

2. Identify and characterize factors of the environment that are affected by HVAC&R systems, equipment, operations, and maintenance that result in adverse effects on occupant health and comfort. Thus, technologies related to air move-

ment or air distribution, including methods of air supply, distribution within occupied spaces, return, and exhaust, are within the scope of ASHRAE indoor air quality activity.

3. Provide increased guidance for design, installation, operation, and maintenance of HVAC&R systems that recognizes effects of the Society's technology on the environment and natural resources in protecting occupant health and comfort.

4. Promote increased concern for indoor air quality in its activities, including standards development, research, programs, publications, education, technical, and others (e.g., energy management, etc.)

5. Increase its communication of indoor air quality information.

6. Participate in developing local building codes with concern for indoor air quality, if requested by code officials.

7. Expand its interaction with other professional and technical societies and other groups having interests in indoor air quality.

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II

100TH CONGRESS
1ST SESSION

S. 1629

To authorize a national program to reduce the threat to human health posed by exposure to contaminants in the air indoors.

IN THE SENATE OF THE UNITED STATES

AUGUST 7 (legislative day, AUGUST 5), 1987

Mr. MITCHELL (for himself, Mr. CHAFEE, Mr. DURENBERGER, Mr. BAUCUS, Ms. MIKULSKI, Mr. STAFFORD, and Mr. LAUTENBERG) introduced the following bill; which was read twice and referred to the Committee on Environment and Public Works

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A BILL

To authorize a national program to reduce the threat to human health posed by exposure to contaminants in the air indoors.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SHORT TITLE AND TABLE OF CONTENTS

SECTION 1. (a) TITLE.—This Act, together with the following table of contents, may be cited as the "Indoor Air Quality Act of 1987".

(b) TABLE OF CONTENTS.—

Sec. 1. Title.
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Sec. 5. Indoor air quality research.

Sec. 6. Indoor air contaminant health advisories.
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Sec. 9. Office of Indoor Air Quality.
Sec. 10. National Indoor Air Quality Council.
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Sec. 12. Indoor air quality information clearinghouse.
Sec. 13. State and Federal law.
Sec. 14. Authorizations.

FINDINGS

SEC. 2. FINDINGS.—The Congress finds that—

(A) Americans spend up to 90 per centum of a day indoors and, as a result, have a significant exposure to contaminants in the air indoors;

(B) exposure to indoor air contaminants occurs in workplaces, schools, public buildings, residences, and transportation vehicles;

(C) recent scientific studies indicate that pollutants in the indoor air include radon, asbestos, volatile organic chemicals (for example, formaldehyde, benzene), combustion byproducts (for example, carbon monoxide, nitrogen oxides, carbon dioxide) metals and gases (for example, lead, chlorine, ozone), respirable particles, biological contaminants, and other contaminants;

(D) a number of contaminants found in both ambient air and indoor air may occur at higher concentrations in indoor air than in outdoor air;

(E) indoor air pollutants pose serious threats to public health including cancer, respiratory illness, skin and eye irritation, and related effects;

(F) radon is among the most harmful indoor air pollutants and is estimated to cause between five thousand and twenty thousand lung cancer deaths each year,

(G) other indoor air pollutants are estimated to cause as many as three thousand five hundred and six thousand five hundred additional cancer deaths per year;

(H) sources of indoor air pollution include conventional ambient air pollution sources, building materials, consumer and commercial products, combustion appliances, indoor application of pesticides and other sources;

(I) there is not an adequate effort by Federal agencies to conduct research on the seriousness and extent of indoor air contamination, to identify the health effects of indoor air contamination, and to develop control technologies and other methods of reducing human exposure to such contamination;

(J) there is not an adequate effort by Federal agencies to develop response plans to reduce human exposure to indoor air contaminants and there is a need for improved coordination of the activities of these agencies and for reporting to the Congress on the effectiveness of these activities; and

(K) State governments can contribute to the effective reduction of human exposure to indoor air contaminants and the Federal Government should assist States in development of programs to reduce exposures to these contaminants.

PURPOSE

SEC. 3. PURPOSE.—The purposes of this title are to—

(A) establish at the Environmental Protection Agency and at other agencies of the United States a comprehensive and coordinated program of research and development concerning the seriousness and extent of indoor air contamination, the human health effects of indoor air contaminants, and the technological and other methods of reducing human exposures to such contaminants;

(B) establish a process whereby the existing authorities of Federal statutes will be directed and focused to assure the full and effective application of these authorities to reduce human exposure to indoor air contaminants where appropriate;

(C) provide support to State governments to demonstrate and develop air quality management strategies, assessments, and response programs; and

(D) to authorize activities to assure the general coordination of indoor air quality-related activity, to provide for reports on indoor air quality to Congress, to assure that data and information in indoor air quality issues is available to interested parties, to provide training, information, and technical assistance to the public and private sector, and for other purposes.

DEFINITIONS

SEC. 4. DEFINITIONS.—Section 302 of this Act is amended by adding at the end thereof the following new subsections:

"(q) the term 'Agency' means the United States Environmental Protection Agency;

"(r) the term 'indoor' refers to the enclosed portions of buildings including nonindustrial workplaces, public buildings, Federal buildings, schools, commercial buildings, residences, and the portions of vehicles occupied by passengers;

"(s) the term 'indoor air contaminant' means any solid, liquid, semisolid, dissolved solid, biological organism, aerosol, or gaseous material, including combinations or mixtures of substances, which may impair the quality of indoor air or have an adverse effect on human health;

"(t) the term 'Federal agency' or 'agency of the United States' means any department, agency or other instrumentality of the Federal Government, any independent agency or establishment of the Federal Government including any government corporation; and "(u) the term 'Federal building' means any building which is owned by the Federal Government.".

INDOOR AIR QUALITY RESEARCH

SEC. 5. (a) AUTHORITY.—(1) The Administrator shall, in cooperation with appropriate Federal agencies, establish a national research, development, and demonstration program to assure the quality of air indoors and as part of such program shall promote the coordination and acceleration of research, investigations, experiments, demonstrations, surveys, and studies relating to the causes, sources, effects, extent, prevention, detection, and correction of contamination of indoor air.

(2) In carrying out the provisions of this section, the Administrator is authorized to—

(A) collect and make available to the public through publications and other appropriate means, the results of research, development and demonstration activities conducted pursuant to this section;

(B) conduct research, development and demonstration activities and cooperate with other Federal agencies, with State and local government entities, interstate and regional agencies, other public agencies and authorities, nonprofit institutions and organizations and other persons in the preparation and conduct of such research, development and demonstration activities;

(C) make grants to the States or to local government entities, to other public agencies and authorities, to nonprofit institutions and organizations, and to other persons;

(D) enter into contracts or cooperative agreements with public agencies and authorities, nonprofit institutions and organizations, and other persons;

(E) conduct studies, including epidemiological studies, of the effects of indoor air contaminants or potential contaminants on mortality and morbidity and clinical and laboratory studies on the immunologic, biochemical, physiological, and toxicological effects including the carcinogenic, teratogenic, mutagenic, cardiovascular, and neurotoxic effects of indoor air contaminants or potential contaminants;

(F) develop and disseminate informational documents on indoor air contaminants describing the nature and characteristics of such contaminants in various concentrations;

(G) develop effective and practical processes, methods, and techniques for the prevention, detection, and correction of indoor air contamination;

(H) construct such facilities and staff and equip them as may be necessary to carry out the provisions of this section;

(I) call conferences concerning the potential or actual contamination of indoor air giving opportunity for interested persons to be heard and present papers at such conferences;

(J) utilize, on a reimbursable basis, facilities and personnel of existing Federal scientific laboratories and research centers; and

(K) acquire secret processes, technical data, inventions, patent applications, patents, licenses, and an interest in lands, plants, equipment and facilities and other property rights, by purchase, license, lease, or donation.

(b) PROGRAM REQUIREMENTS.—The Administrator shall conduct or assist research, investigations, studies, surveys, or demonstrations with respect to, but not limited to, the following—

(A) the effects on human health of contaminants or combinations of contaminants at various levels whether natural or anthropogenic, that are found or are likely to be found in indoor air;

(B) the exposure of persons to contaminants that are found in indoor air (including exposure to such substances from sources other than indoor air contamination including drinking water, diet, or other exposures);

(C) the exposure of persons to contaminants in different building classes or types, and in vehicles, and assessment of the association of particular contaminants and particular building classes or types and vehicles;

(D) identification of building classes or types and design features or characteristics which increase the likelihood of exposure to indoor air contaminants;

(E) identification of the sources of indoor air contaminants including association of contaminants with outdoor sources, building or vehicle design, classes or types of products, building management practices, equipment operation practices, building materials, and related factors;

(F) assessment of relationships between contaminant concentration levels in ambient air and the contaminant concentration levels in the indoor air;

(G) methods and techniques for characterizing and modeling indoor air movement and flow within buildings or vehicles, including the transport and dispersion of contaminants in the indoor air;

(H) the fate, including degradation and transformation, of particular contaminants in indoor air;

(I) methods and techniques to characterize the association of contaminants, the levels of contaminants, and the potential for contamination of new construction with climate, building location, seasonal change, soil and geologic formations, and related factors;

(J) methods, techniques and instruments for sampling indoor air to determine the presence and level of contaminants including sample collection and the storage of samples before analysis and development of methods to improve the efficiency and reduce the cost of analysis;

(K) development of air quality sampling methods and instruments which are inexpensive and easy to use and may be used by the general public;

(L) development of control technologies or other measures to prevent the entrance of contaminants into buildings or vehicles, including air intake protection, sealing, and related measures;

(M) development of control technologies or other measures to reduce the concentrations of contaminants indoors, including control of emissions from internal sources of contamination, improved air exchange and ventilation, and related measures;

(N) development of materials and products as alternatives to materials or products which are now in use and which contribute to indoor air contamination;

(O) development of building or vehicle management practices and related activities which will contribute to the reduction of indoor air contaminants; and

(P) development of equipment and processes for removal of contaminants from the indoor air.

(c) TECHNOLOGY DEMONSTRATION PROGRAM.—(1) The Administration may enter into cooperative agreements or contracts, or provide financial assistance in the form of grants, to public agencies and authorities, nonprofit institutions and organizations or other persons, to demonstrate practices, methods, technologies, or processes which may be effective in controlling sources or potential sources of indoor air contamination and preventing the occurrence of indoor air contamination.

(2) The Administrator may assist demonstration activities under paragraph (1) of this subsection only if—

(A) such demonstration activity will serve to demonstrate a new or significantly improved practice, method, technology or process or the feasibility and cost effectiveness of an existing, but unproven, practice, method, technology, or process and will not duplicate other Federal, State, local, or commercial efforts to demonstrate such practice, method, technology, or process;

(B) such demonstration activity meets the requirements of this section and serves the purposes of this Act;

(C) the demonstration of such practice, technology, or process will comply with all other laws and regulations for the protection of human health, welfare, and the environment; and

(D) in the case of a contract or cooperative agreement, such practice, method, technology, or process would not be adequately demonstrated by State, local, or private persons or in the case of an application for financial assistance by a grant, such practice, method, technology, or process is not likely to receive adequate financial assistance from other sources.

(3) The demonstration program established by this subsection shall include solicitations for demonstration projects, selection of suitable demonstration projects from among those proposed, supervisions of such demonstration projects, evaluation of the results of demonstration projects, and dissemination of information on the effectiveness and feasibility of the practices, methods, technologies and processes which are proven to be effective. The Administrator shall publish regulations to assure satisfactory implementation of each element of the demonstration program authorized by this subsection.

(4) Within one hundred and eighty days after the date of enactment of this Act, and no less often than every twelve months thereafter, the Administrator shall publish a solicitation for proposals to demonstrate, prototype or at full-scale, practices, methods, technologies, and processes which are (or may be) effective in controlling sources or potential sources of indoor air contaminants. The solicitation notice shall prescribe the information to be included in the proposal, including technical and economic information derived from the applicant's own research and development efforts, and other information sufficient to permit the Administrator to assess the potential effectiveness and feasibility of the practice, method, technology, or process proposed to be demonstrated.

(5) Any person and any public or private nonprofit entity may submit an application to the Administrator in response to the solicitations required by paragraph (4) of this section. The application shall contain a proposed demonstration plan setting forth how and when the project is to be carried out and such other information as the Administrator may require.

(6) In selecting practices, methods, technologies or processes to be demonstrated, the Administrator shall fully review the applications submitted and shall evaluate each project according to the following criteria—

(A) the potential for the proposed practice, method, technology, or process to effectively control sources or potential sources of contaminants which present the greatest risk to human health;

(B) the capability of the person or persons proposing the project to successfully complete the demonstration as described in the application;

(C) the likelihood that the demonstrated practice, method, technique or process could be applied in other locations and circumstances to control sources or potential sources of contaminants, including considerations of cost, effectiveness, and feasibility;

(D) the extent of financial support from other persons to accomplish the demonstration as described in the application; and

(E) the capability of the person or persons proposing the project to disseminate the results of the demonstration or otherwise make the benefits of the practice, method, or technology widely available to the public in a timely manner. The Administrator shall select or refuse to select a project for demonstration under this subsection within ninety days of receiving the complete application for such project. In the case of a refusal to select a project, the Administrator shall notify the applicant within such ninety-day period of the reasons for the refusal.

(7) Each demonstration project under this section shall be performed by the applicant, or by a person satisfactory to the applicant, under the supervision of the Administrator. The Administrator shall enter into a written agreement with each applicant granting the Administrator the responsibility and authority for testing procedures, quality control, monitoring, and other measurements necessary to determine and evaluate the results of the demonstration project.

(8) The Administrator shall enter into arrangements, wherever practicable and desirable, to provide for monitoring testing procedures, quality control, and such other measurements necessary to evaluate the results of demonstration projects or facilities intended to control sources or potential sources of contaminants.

(9) Each demonstration project under this section shall be completed within such time as is established in the demonstration plan. The Administrator may extend any deadline established under this subsection by mutual agreement with the applicant concerned.

(10) Total Federal funds for any demonstration project under this section shall not exceed 75 per centum of the total cost of such project. In cases where the Administrator determines, in accordance with criteria established by regulation,

that research under this section is of a basic nature which would not otherwise be undertaken, the Administrator may approve grants under this section with a matching requirement other than that specified in this subsection, including full Federal funding.

(d) CLARIFICATION OF AUTHORITY.—(1) The Superfund Amendments and Reauthorization Act of 1986 is amended to delete title IV of such Act.

(2) Not later than October 1, 1988, the Administrator shall submit to the Congress a report respecting his activities under title IV of the Superfund Amendments and Reauthorization Act of 1986 and his activities pursuant to this title, and making such recommendations as appropriate.

INDOOR AIR CONTAMINANT HEALTH ADVISORIES

SEC. 6. (a) LIST OF CONTAMINANTS.—(1) Within two hundred and forty-days after the date of enactment of this Act, the Administrator shall prepare and publish in the Federal Register a list of the contaminants which are known to occur (or which may be expected to occur) in indoor air. The list may include combinations or mixtures of contaminants and may refer to such combinations or mixtures by a common name.

(2) The Administrator shall from time to time and as necessary to carry out the provisions of this Act, but not less often than biennially, review and revise such list adding other contaminants pursuant to the requirements of this Act.

(3) The list provided for in paragraph (1) of this subsection shall include, at a minimum—

(A) any air pollutant listed pursuant to section 108(a)(1) of the Clean Air Act (42 U.S.C. 1857 et seq.);

(B) any hazardous air pollutant listed pursuant to section 112(b)(1)(A) of the Clean Air Act (42 U.S.C. 1857 et seq.);

(C) any other contaminants which are known to occur (or which may be expected to occur) in indoor air.

(4) In development of the list provided for in paragraph (1) of this subsection or in revision of such list pursuant to paragraph (2), the Administrator shall provide for public review and comment.

(5) The listing of contaminants under this subsection is not an agency rulemaking and is not subject to the requirements of section 553 of title 5 of the United States Code. In considering objections raised in any judicial action, the court shall uphold the Administrator's decision to list a particular contaminant unless the objecting party can demonstrate that the decision was arbitrary or capricious or otherwise not in accordance with the law. The list of contaminants prepared in accordance with this subsection shall not be construed to

indicate that those contaminants not listed are safe for human exposure or without adverse health effect.

(6) Upon application of the Governor of a State showing that a contaminant or potential contaminant in the indoor air which is not listed pursuant to paragraph (1) of this subsection may be reasonably anticipated to endanger human health as a result of its presence in the indoor air, the Administrator shall, within ninety days, revise the list established by paragraph (1) of this subsection to include such contaminant or publish in the Federal Register the reasons for not making such a revision.

(b) CONTAMINANT HEALTH ADVISORIES.—The Administrator shall, in consultation with the advisory panel provided for in subsection (e) of this section, publish advisory materials addressing the human health effects of individual contaminants listed pursuant to subsection (a) of this section. Such advisory materials shall describe—

(A) the physical, chemical, biological, and radiological properties of the contaminant;

(B) the human health effects of the contaminant in various indoor environments and in various concentrations;

(C) an analysis of the risk posed by the contaminant to human health at various concentrations;

(D) the concentration of the contaminant at which there is no known or anticipated human health effect, with an adequate margin of safety;

(E) to the extent that the contaminant, or a mixture of contaminants, is associated with a particular substance or material, emissions rates which are expected to result in varying levels of contaminant concentration in indoor air;

(F) any indoor air contaminant standards or related action levels which are in effect under any authority of a Federal statute or under the authority of State statutes; and

(G) to the extent such information is available, any indoor air contaminant standards or related action levels which are in effect under the authority of any local government.

(c) FORMAT.—The Administrator shall establish and utilize a standard format of presentation of indoor air contaminant health advisories. The format shall be designed to facilitate public understanding of the risks of exposure to indoor air contaminants and shall include a summary of the research and information concerning the contaminant which is understandable to public health professionals and to those who lack training in toxicology.

(d) TIMETABLE FOR ESTABLISHING ADVISORIES.—The Administrator shall publish advisories for individual indoor air contaminants listed pursuant to subsection (a) of this section as expeditiously as possible. At a minimum, the Administrator shall publish not less than six advisories within one and one-half years of enactment of this Act and shall publish an additional six advisories within three years of enactment of this Act.

(e) ADVISORY PANEL.—The Indoor Air Panel of the EPA Science Advisory Board shall advise the Administrator with respect to the implementation of this section including, but not limited to, the listing of contaminants, the contaminants for which advisories should be published, the order in which advisories should be published, the content, quality, and format of advisory documents, and the revision of such documents.

(f) REVISION OF ADVISORIES.—Advisories shall be reviewed, revised and republished to reflect new scientific and related findings or information on a periodic basis but not less frequently than five years.

NATIONAL INDOOR AIR QUALITY RESPONSE PLAN

SEC. 7. (a) AUTHORITY.—(1) The Administrator shall develop and publish a national indoor air quality response plan.

(2) The response plan provided for under this section shall establish a range of response actions which will result, to the fullest extent practicable, in—

(A) attainment in the indoor air of the standards established under sections 109 and 112 of the Clean Air Act (42 U.S.C. 1857 et seq.);

(B) attainment of the advisory concentration levels established under section 6(b)(1)(D) of this Act; and

(C) reduction in the concentration levels of contaminants identified in section 6(a) of this Act.

(b) EXISTING AUTHORITY.—The Administrator shall include in the plans provided for in subsection (a) of this section a description of specific response actions based on existing statutory authorities including authorities provided in—

(A) titles I, II, and III of the Clean Air Act (42 U.S.C. 1857 et seq.);

(B) the Toxic Substances Control Act;

(C) the Federal Insecticide, Fungicide, and Rodenticide Act;

(D) the Safe Drinking Water Act;

(E) the authorities of the Consumer Product Safety Commission;

(F) the authorities of the Occupational Safety and Health Administration; and

(G) other regulatory and related authorities provided under any other Federal statute.

(c) SUPPORTING ACTIONS.—The Administrator shall include in the plans provided for in subsection (a) of this section specific nonregulatory actions which will contribute to the reduction of human exposure to indoor air contaminants including but not limited to—

(A) programs to disseminate technical information to public health, design, and construction professionals concerning the risks of exposure to indoor air contaminants and methods and programs for reducing exposures to such contaminants;

(B) education programs for the general public concerning the health threats posed by indoor air contaminants and appropriate individual response actions;

(C) technical assistance to States and local air pollution control organizations and related groups concerning the risks of exposure to indoor air contaminants and methods and programs for reducing exposures to such contaminants;

(D) development of model building codes, including ventilation rates, for various types of buildings designed to reduce concentration levels of indoor air contaminants; and

(E) research initiatives to develop technology or methods for the control of indoor air contaminants.

(d) CONTENTS OF PLAN.—In describing specific actions to be taken under subsections (b) and (c) of this section, the Administrator shall—

(A) identify the contaminant or contaminants to be addressed by a particular action;

(B) identify the statutory basis for the action;

(C) identify the schedule and process for implementation of the action;

(D) identify the Federal agency responsible for the action; and

(E) identify the financial resources needed to implement the specific action and the source of these resources.

(e) FEDERAL BUILDING RESPONSE PLAN.—(1) The plan provided for in subsection (a) of this section shall include a specific response plan addressing indoor air quality in Federal buildings.

(2) Federal building response plans shall provide that air quality in Federal buildings attain, to the extent practicable taking technologic feasibility into consideration, the standards established under sections 109 and 112 of the Clean Air Act (42 U.S.C. 1857 et seq.), and the contaminant concentration levels specified in section 6(b)(1)(D) of this Act.

(3) Federal building response plans provided for in paragraph (1) of this subsection shall include—

(A) a list of all Federal buildings;

(B) a description and schedule of general response actions including general management practices, product purchase guidelines, air quality problem identification practices and methods, personnel training programs, and other actions to be implemented to reduce exposures to indoor air contaminants in those buildings listed in paragraph (A);

(C) a list of individual buildings listed in paragraph (A) for which there is a reasonable likelihood that standards under section 109 or 112 of the Clean Air Act (42 U.S.C. 1857 et seq.) or a health advisory under section 6(b)(1)(D) may be exceeded;

(D) a description and schedule of specific response actions to be implemented in each specific building identified in paragraph (C) to achieve compliance with standards under section 109 or 112 of the Clean Air Act (42 U.S.C. 1857 et seq.) or a health advisory under section 6(b)(1)(D);

(E) an identification of the Federal agency responsible for funding and implementation of each response action identified in paragraphs (B) and (D); and

(F) an identification of the costs of each response action identified in paragraphs (B) and (D) and the source of these resources.

(4) The response plan provided for in subsection (e) shall address each Federal building identified in paragraph 3(A), except that the Administrator, in consultation with the Administrator of the General Services Administration, may identify specific buildings to be exempted from coverage under this subsection. Such buildings may be exempted on the grounds of—

(A) national security;

(B) anticipated demolition or termination of Federal ownership within three years; and

(C) specialized use of a building which precludes necessary actions to obtain applicable standards or advisory concentration levels.

(5) Any person may petition the Administrator to include a particular building in the list provided for in paragraph 3(C) of this section. Such petition shall provide a showing that indoor air contaminants have been found, or may reasonably be expected to be found, in the building in excess of a standard established pursuant to section 109 or 112 of the Clean Air Act (42 U.S.C. 1857 et seq.) or a health advisory provided for in section 6(b)(1)(D). Within ninety days, the Administrator shall add the building to the list provided

for in paragraph 3(C) or shall publish in the Federal Register the reasons for not making such additions.

(f) SCHEDULE.—The response plan provided for in subsection (a) shall be submitted to Congress within eighteen months of enactment of this Act and biennially thereafter.

(g) REVIEW.—(1) The Administrator shall provide that the response plan provided for in subsection (a) shall be published in the Federal Register for public review and comment not less than three months prior to submission to the Congress. The Administrator shall include in the response plan a summary of public comments.

(2) The Administrator shall provide for the review and comment on the response plan by the National Indoor Air Quality Council provided for under section 40 of this Act. The Administrator shall include in the response plan a letter and any supporting materials providing the comments of the National Indoor Air Quality Council.

STATE AND LOCAL INDOOR AIR QUALITY PROGRAMS

SEC. 8. (a) MANAGEMENT AND ASSESSMENT STRATEGY DEMONSTRATION.—(1) The Governor of a State may apply to the Administrator for grant support for demonstration of the development of a management strategy and assessment with respect to indoor air quality within such State.

(2) State indoor air quality management strategies shall—

(A) identify a lead agency and provide an institutional framework for protection of indoor air quality;

(B) identify and describe existing programs, controls or related activities concerning indoor air quality, including regulations, education programs, assessment programs, or other activities;

(C) assure coordination among Federal, State, and local agencies involved in indoor air quality activities in the State; and

(D) assure coordination of indoor air quality programs with ambient air quality programs and related activities.

(3) State indoor air quality assessment programs shall—

(A) identify indoor air contaminants of concern and, to the extent practicable, assess the seriousness and the extent of indoor air contamination by contaminants listed in section 405(a) of this Act;

(B) identify the classes or types of buildings or other indoor environments in which indoor air contaminants pose the most serious threat to human health;

(C) if applicable, identify geographic areas in the State where there is a reasonable likelihood of indoor air contamination as a result of the presence of contaminants in the ambient air or the existence of sources of a contaminant;

(D) establish methods and procedures for indoor air contaminant assessment and monitoring; and

(E) provide for periodic assessments of indoor air quality and identification of indoor air quality changes and trends.

(4) States which are selected to demonstrate the development of management and assessment strategies shall provide a management strategy and assessment pursuant to subsections (2) and (3) to the Administrator within thirty-six months of selection and shall certify to the Administrator that the strategy and assessment meet the requirements of this Act.

(5) States shall provide for public review and comment on the management strategy and assessment prior to submission of such strategy and assessment to the Administrator.

(b) RESPONSE PROGRAMS.—(1) A Governor of a State or the executive officer of a local air pollution control agency may apply to the Administrator for grant assistance to develop a response program designed to reduce the human exposure to an indoor air contaminant or contaminants in the State or in a specific class or type of building in that State, or in a specific geographic area of that State.

(2) A response program shall—

(A) address a contaminant or contaminants listed pursuant to section 6(a) of this Act;

(B) identify existing data and information concerning the contaminant or contaminants to be addressed, the class or type of building to be addressed, and the specific geographic area to be addressed;

(C) describe and schedule the specific actions to be taken to reduce human exposure to the identified contaminant(s);

(D) identify the State or local agency or public organization which will implement the response actions;

(E) identify the Federal, State, and local financial resources to be used to implement the response program; and

(F) provide for the assessment of the effectiveness of the response program.

(c) GRANT MANAGEMENT.—(1) Grants under subsection (a)(1) of this subsection shall not be less than $75,000 for each fiscal year and shall be available to a selected State for a period not to exceed three years.

(2) In selecting States for demonstration of management strategies and assessments, the Administrator shall consider—

(A) the previous experience of the State in addressing indoor air quality issues;

(B) the seriousness of the indoor air quality issues identified by the State; and

(C) the potential for demonstration of innovative management or assessment measures which may be of use to other air pollution control agencies.

(3) Grants under subsection (b)(1) of this section shall not exceed $250,000 per fiscal year and shall be available to the State for a period of not to exceed three years.

(4) In selecting response programs developed under section (b) for grant assistance, the Administrator shall consider—

(A) the potential for the response program to bring about reductions in indoor air contaminant levels;

(B) the contaminants to be addressed, giving priority to contaminants for which health advisories have been developed pursuant to section 405 of this Act;

(C) the type of building to be addressed, giving priority to building types in which substantial human exposures to indoor air contaminants occur; and

(D) the potential for development of innovative response measures or methods which may be of use to other air pollution control agencies.

(5) The Federal share of grants under subsections (a) and (b) of this section shall not exceed 75 per centum of the costs incurred in implementation of such activities and shall be made on the condition that the non-Federal share is provided from non-Federal funds.

(6) Funds granted pursuant to subsections (a) and (b) in a fiscal year shall remain available for obligation for the fiscal year in which obligated and for the following fiscal year.

(7) No grant shall be made under subsection (b) in any fiscal year to a State or air pollution control agency which in the preceding year received a grant under subsection (b) unless the Administrator determines that such agency satisfactorily implemented such grant activities in such preceding fiscal year.

(8) Air pollution control agencies receiving funds under subsections (a) and (b) of this section shall agree to provide such information pertaining to grant funded activities to the Administrator as he considers necessary.

OFFICE OF INDOOR AIR QUALITY

SEC. 9. (a) ESTABLISHMENT OF OFFICE.—The Administrator shall establish an Office of Indoor Air Quality within the Office of Air and Radiation at the Environmental Protection Agency.

(b) RESPONSIBILITIES OF OFFICE.—The Office of Indoor Air Quality shall—

(A) list indoor air contaminants and develop health advisories pursuant to section 6 of this Act;

(B) develop national indoor air quality response plans as provided for in section 7 of this Act;

(C) manage Federal grant assistance provided to air pollution control agencies under section 8 of this Act;

(D) assure the coordination of Federal statutes and programs administered by the Agency relating to indoor air quality and reduce duplication or inconsistencies within these programs;

(E) work with other Federal agencies to assure the effective coordination of programs related to indoor air quality; and

(F) work with public interest groups and the private sector in development of information related to indoor air quality including the health threats of human exposure to indoor air contaminants, the development of technologies and methods to control such contaminants, and the development of programs to reduce contaminant concentrations.

(c) ORGANIZATION OF OFFICE.—The Office of Indoor Air Quality shall—

(A) be directed by a Director who shall be a member of the Senior Executive Service;

(B) include a staff of not less than ten full-time equivalent employees; and

(C) be supported by not less than one full-time equivalent employee in each Agency regional office.

NATIONAL INDOOR AIR QUALITY COUNCIL

SEC. 10. (a) AUTHORITY.—The President of the United States shall establish, within the Executive Office of the President, a National Indoor Air Quality Council.

(b) RESPONSIBILITIES.—The National Indoor Air Quality Council shall—

(A) provide for the full and effective coordination of Federal agency activities relating to indoor air quality;

(B) provide a forum for resolution of conflicts or inconsistencies in statutes or programs related to indoor air quality;

(C) advise the President and other members of the Executive Department on the development of indoor air quality programs and policies;

(D) review and comment on the national indoor air response program developed pursuant to section 7 of this Act;

(E) prepare a report to Congress pursuant to subsection (d) of this subsection.

(c) ORGANIZATION.—(1) The National Indoor Air Quality Council shall include senior representatives of Federal Agencies involved in indoor air quality programs including—

(A) the Environmental Protection Agency, which shall chair the Council;

(B) the Department of Human Services;

(C) the Department of Labor;

(D) the Department of Housing and Urban Development;

(E) the Department of Energy;

(F) the Department of Transportation;

(G) the Consumer Product Safety Commission; and

(H) the General Services Administration.

(2) Additional members of the Council shall include a representative to be appointed by the President, a representative to be appointed by the Majority Leader of the Senate, and a representative to be appointed by the Speaker of the House. Appointed representatives shall not be employees of a Federal agency.

(3) The Council shall be served by a staff to include an Executive Director, who shall be a member of the Senior Executive Service, and not less than three full equivalent employees.

(d) REPORT TO CONGRESS.—(1) The Council shall submit to the Congress, within eighteen months of enactment and biennially thereafter, a report which shall—

(A) describe the seriousness and extent of indoor air contamination;

(B) summarize the major research issues concerning the protection of indoor air quality, describe the research accomplishments of Federal agencies over the previous two years, and provide an agenda of indoor air quality research for Federal agencies over a three-year period;

(C) provide a general description of the activities to be conducted by Federal agencies to address indoor air quality problems over the following three-year period; and

(D) make recommendations for any actions needed to assure the quality of indoor air, including recommendations relating to institutional structures, funding, and legislation.

(2) the Council shall provide for public review and comment on the report required by this subsection.

FEDERAL BUILDING DEMONSTRATION PROGRAM

SEC. 11. (a) AUTHORITY.—The Administrator, in consultation with the Administrator of the General Services Administration, shall conduct a program to demonstrate methods of reducing indoor air contaminant concentrations in new Federal buildings.

(b) INDOOR AIR QUALITY RESERVE.—(1) The Administrator of the General Services Administration shall reserve 0.5 per centum of any funds appropriated for construction of new Federal buildings for design and construction of measures to reduce indoor air contaminant concentrations within such buildings.

(2) Measures which may be funded with the reserve provided for in this subsection may include, but are not limited to—

(A) development and implementation of general design principles intended to avoid or prevent contamination of indoor air;

(B) design and construction of improved ventilation techniques or equipment,

(C) development of product purchasing guidelines;

(D) design and construction of contaminant detection and response systems; and

(E) development of building management guidelines and practices.

(3) Upon completion of construction of each Federal building covered by this section, the Administrator of the General Services Administration shall file with the Administrator, with the Clearinghouse established under section 12 of this Act, and with the Council established under section 10 of this Act, a report describing the uses made of the reserve provided for in this subsection. Such report shall be in sufficient detail to provide design and construction professionals with models and general plans of various indoor air contami-

nant reduction measures adequate to assess the appropriateness of such measures for application in other buildings.

(4) The Administrator of the General Services Administration, with the concurrence of the Administrator, may exempt a planned Federal building from the requirements of this section if he finds that such exemption is required on the grounds of national security or that the intended use of the building is not compatible with the authority of this section.

NATIONAL INDOOR AIR QUALITY INFORMATION CLEARINGHOUSE

SEC. 12. (a) AUTHORITY.—(1) The Administrator is authorized and directed to establish a national indoor air quality clearinghouse to be used to disseminate indoor air quality information to other Federal agencies, State, and local governments, and private organizations and individuals.

(2) The clearinghouse shall be a repository for reliable indoor air quality related information to be collected from and made available to government agencies and private organizations and individuals. At a minimum, the clearinghouse established by this section shall make available reports, programs, and materials developed pursuant to the requirements of this Act.

(3) The Administrator may provide for the design, development, and implementation of the clearinghouse through a contractual agreement with a nonprofit organization.

STATE AND FEDERAL AUTHORITY

SEC. 13. Nothing in this title shall be construed, interpreted, or applied to preempt, displace, or supplant any other State or Federal law, whether statutory or common or any local ordinance.

AUTHORIZATIONS

SEC. 14. (a) AGENCY AUTHORIZATIONS.—(1) For the purpose of carrying out sections 5 and 6 of this Act there is authorized to be appropriated $25,000,000 for each of the fiscal years ending September 30, 1988, 1989, 1990, 1991 and 1992. Of such sums appropriated, one quarter shall be reserved for implementation of section 6 of this Act and one quarter shall be reserved for implementation of section 5(c) of this Act.

(2) For the purpose of carrying out sections 7, 9, and 12 there is authorized to be appropriated $10,000,000 for each of the fiscal years ending September 30, 1988, 1989, 1990, 1991, and 1992. Of such sums appropriated, one-fifth shall be reserved for implementation of section 12.

(3) For the purpose of carrying out section 8(a) of this Act, there is authorized to be appropriated $10,000,000 for each of the fiscal years ending September 30, 1988, 1989, 1990, 1991, and 1992. For the purpose of carrying out section 8(b) of this Act, there is authorized to be appropriated $10,000,000 for each of the fiscal years ending September 30, 1988, 1989, 1990, 1991, and 1992.

(b) OTHER AUTHORIZATIONS.—(1) For the purpose of carrying out section 10 of the Act there is authorized to be appropriated $3,000,000 for each fiscal year ending September 30, 1988, 1989, 1990, 1991, and 1992.

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